

THE PHONETIC AND PHONOLOGICAL DEVELOPMENT OF A THAI BABY:

FROM EARLY COMMUNICATIVE INTERACTION TO SPEECH

Thesis submitted for the Degree of
Doctor of Philosophy

by

PINTIP TUAYCHAROEN

School of Oriental and African Studies

University of London

January 1977



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A B S T R A C T

The present thesis aims to give a phonetic and phonological account of how the speech of a Thai baby, aged 3-18 months, emerges from early vocalizations. The phonological description is made within the framework of 'prosodic analysis'.

The introduction includes information on related literature, a brief outline of Thai phonology, the method of collecting data, the theoretical basis of prosodic phonology, the background of the child and adults concerned in the study, and a glossary of notations and terms used in the thesis.

The phonetic and phonological development is presented in Section I where the 10 stages of speech development are described with reference to phonetic development, vocal play, relationship between adult models and baby's responses, and phonological development.

Adult-baby interaction and adult language addressed to the baby are described in Appendix 1.

The findings of the study are summarized in the conclusion and discussion section where a general picture of the speech development and the acquisition of features of the Thai language: tones, aspiration, and final glottalization, are discussed.

Examples of adult-baby 'dialogues' as well as of the baby's vocalizations and vocabulary are given in Appendix 2.

ACKNOWLEDGEMENT

I wish to express my gratitude to Mrs. N. Waterson, my supervisor, for her indispensable help in supervising this work. In particular, I am immensely grateful for her patience in reading my chapters, her suggestions and criticisms, and above all for the encouragement and kindness she has given me.

My gratitude is also due to Mrs. E.M. Whitley and Professor E.J.A. Henderson who have given me invaluable suggestions concerning my study, and to Mr. A.W. Stone who has been exceedingly helpful in dealing with the mechanical side of the research, and in carrying out the experiments.

I am deeply indebted to my sister, her husband, and my mother for their help in collecting most of the data for me. Without their cooperation, this work would not be as complete as it appears.

This work could not have been done without my nephew, Pui, the subject of this thesis. I thank him for making the study possible, and for giving me pleasure in carrying out the work; above all, his babbling and speech have sweetened the difficult task of transcription.

Finally, I wish to thank Miss J. Guillaume who has typed this thesis, and to thank the Thai Government who has given me a grant for the research.

LIST OF CONTENTS

	Page
ABSTRACT	i
ACKNOWLEDGEMENT	ii
INTRODUCTION	1
Survey of the field	1
Aims of the study	9
Method of collecting data	11
The child and adults	13
Outline of the phonetic and phonological systems of the Thai language	14
Method of analysis	20
Theoretical basis for analysis	21
Glossary of notations and terms	25
SECTION I: Phonetic and Phonological Development	
from Babbling to Speech	29
Brief outline of language development	30
Chapter 1: Early Babbling	32
Stage I (0;3.0-0;3.22)	
General phonetic description	32
Relationship between adult models and the baby's responses	42

	Page
Pre-phonological description of vocalizations	
in Stage I	47
Conclusions	52
Stage II (0;3.23-0;4.19)	
General phonetic description	54
Relationship between adult models and the	
baby's responses	57
Pre-phonological description of vocalizations	
in Stage II	61
Conclusions	61
Chapter 2: Later Babbling	63
Stage III (0;4.20-0;5.15)	
General phonetic description	63
Relationship between adult models and the	
baby's responses	66
Pre-phonological description of vocalizations	
in Stage III	68
Conclusions	76
Stage IV (0;5.16-0;7.20)	
General phonetic description	77
Relationship between adult models and the	
baby's responses	81
The baby's phonetic system	83
Pre-phonological description of vocalizations	
in Stage IV	85
Conclusions	91

	Page
Chapter 3: The Proto-Language	93
Stage V (0;8.00-0;10.15)	
General phonetic description	93
P's proto-language	97
Relationship between adult models and the baby's responses	103
Pre-phonological description of the proto- language	111
Conclusions	112
Stage VI (0;10.16-0;11.12)	
General phonetic description	114
Relationship between adult models and the baby's responses	117
Pre-phonological description of vocalizations in Stage VI	120
Conclusions	121
Chapter 4: The One Word Utterance Stage	123
Stage VII (0;11.13-1;1.02)	
General phonetic description	123
Relationship between adult models and the child's responses	126
Pre-phonological description of vocalizations in Stage VII	137
Conclusions	137
Stage VIII (1;1.03-1;2.24)	
General phonetic description	139
Relationship between adult models and the child's responses	145

	Page
Phonetic description of the tones	
produced by the child	149
Phonological description of verbalizations	
in Stage VIII	159
Conclusions	164
Stage IX (1;2.25-1;3.23)	
General phonetic description	165
Phonological description	169
Chapter 5: The Start of Two and Three Word	
Utterances	170
Stage X (1;3.24-1;6.0)	
General phonetic description	170
Consonants	171
Vowels	174
Tones	175
Long utterances	177
Phonological description of verbalizations	
in Stage X	180
Conclusions	186
Conclusions and discussion	188
The general development of vocalization	
from Stage I to Stage X	188
Tone acquisition	194
Acquisition of aspiration	196
Final glottalization	196

	Page
SECTION II: Appendices	198
Appendix 1	
Adult-baby interaction and adult language addressed to the baby	198
Appendix 2	
Examples of vocalizations and verbalizations	219
REFERENCES	257

I N T R O D U C T I O N

Survey of the Field

Babbling

Early work on babbling was mostly part of diary studies of language development (Taine, 1877/1971; Lewis, 1936; Leopold, 1939/1970; and others cited in Crystal, 1973). Although the materials are valuable for studies in this field, some of them have been found descriptively inadequate (cf. Crystal, 1973: 9). The reasons for this inadequacy are the problems concerned with the description of babbling, e.g. no objective and accurate description of infants' vocalizations during the early babbling stage, difficulty in clearly defining the transition from babbling to speech, and lack of description of the role of adult-baby interaction (cf. Menyuk, 1971: 54-55).

In so far as babbling is concerned, the characteristics of babbling and the role that babbling plays in the development of language are still in question. The controversies are:

1. Do children produce an 'astonishing quantity and diversity of sound productions' (Jakobson, 1968:21), or do they produce a restricted range of sounds?
2. Is babbling systematic or random?
3. Is babbling a gradual continuous transition to speech (Murai, 1963/1964), or is it a discontinuous process (Jakobson, 1968)?

In more recent work, babbling has become a growing area of interest and a number of studies have been made. Most of them have

looked into those controversial problems, for instance, Gruber (1966/1973), studying the babbling of one child on one day (in terms of distinctive features), finds that there is regularity in babbling. Pierce (1974), who studied the development of vocalizations of English speaking children covering the period from birth to the end of the first year, states that infants do not produce an infinite range of sounds. Oller et al. (1976) studied the babbling of English children aged 4 to 13 months, and argues that the babbling is not at all random, but is systematic. The study also shows that there is continuity from babbling to speech.

Consonantal and vocalic elements, syllable types, and other characteristics of vocalizations are also among the main concerns of investigators into child language development. Lewis (1936) and Leopold (1939) report that back consonant sounds were produced by their subjects in early vocalizations in relation to pleasure and satisfaction. Irwin (1947) finds that during early infancy velars and glottals are relatively frequent, but when words appear, there is a decrement in the relative frequency of their use. Pierce (1974) reports that the three month old children he studied produced a range of consonant-like sounds such as [ʔ h w d n m ŋ ɡ b x ʏ p]. [ʔ h w] occurred most consistently. From six months to twelve months some consonants dropped out or others were added to the set above, but [ʔ h w] remained and were typical. Stark et al. (1975) states that glottal stop and friction noises or trills produced by approximation of the back of the tongue and the soft palate are often produced by young infants.

With regard to vowel sounds, Winitz and Irwin (1958) find that the vowel sounds vary in use at different age levels, i.e. the percentage

of front vowel usage in words is greater at 13-14 months than the percentage of back vowel usage, but at 15-18 months the percentage of back vowels is higher than that of the front vowels. However, [a] predominates at each level. Pierce (1974) notes that at three months, children produce sounds in centralized areas. Sounds in the extreme high-front, high-back or low-back regions do not occur. At six months, vowels within the low-front, mid-front-open and mid-central areas are still predominant. At twelve months, 'all front, mid and low-central and high-back open are produced by nearly all of the children.'

It has been found that most of the infant's early words are monosyllables and disyllables (Winitz and Irwin, 1958), and repetitions have been observed to be among the characteristics of infant vocalizations. Winitz (1961) reports that repetitions occur in vocalizations and in the speech of infancy and early childhood from the first month through the first year.

Prosodic (non-segmental) features of babies' vocalizations, which were previously 'generally ignored or referred to haphazardly' (Crystal, 1973:1) are now of growing concern. Lieberman (1967) in his study of intonation of infant cries states that the infant cry is marked by a rising and then a falling contour, with a gradual fall continuing to the end. Tonkova-Yampol'skaya (1969/1973) studied the fundamental frequency characteristics and intensity changes in vocalizations of Russian infants during the first two years of life, and compared the infants' early intonations with those of the adult. The results show that there is a similarity between adults' and infants' intonations, and that patterns of intonation are developed and mastered earlier than words and individual sounds.

The significance of non-segmental features in child language development has been reported. Crystal (1970:80) states that 'primitive lexical items' produced by young children (aged between 7 and 10 months) 'have both a segmental and a non-segmental character, but it is the latter which is the more stable, and the more readily elicited.' Halliday (1975) finds that a systematic opposition between rising and falling tone has been used by an English child (aged around 19½ months) as a semantic strategy in conveying 'meanings'. It looks as if these prosodic features were prior to the start of language, but this question is still left open.

The role of pitch in child language development is also seen in tone languages where pitch is functionally contrastive at the lexical level. It is of interest to know how 'tone' (functionally contrastive use of pitch) emerges from early vocalizations. Therefore the following questions need to be answered:

1. How does pitch come to be used functionally at the lexical level?
2. What is the sequence of the tone acquisition?
3. Is the tonal system mastered before the segmental system?

Very few studies have been made of language acquisition in the tone language environments. The only studies available to the writer of this thesis are by Chao (1951/1973), Li and Thompson (In press) and Clumeck (1976), all of which report on the language acquisition of Mandarin speaking children.

Chao in his analysis of the Chinese spoken by a twenty-eight month old child reports that his subject acquired the tones, i.e. high-level (5 5), high-rising (3 5), low-dipping (2 1 4), and high-falling to low (5 1), very early. He also finds that there is

confusion between the high-rising and the low-dipping tones.

In the Li and Thompson study of 17 children of Mandarin speaking families, the results reported are in agreement with Chao's that there is confusion between the high-rising and the low-dipping tones. The investigators suggest that the confusion arises from the rising component which the high-rising and the low-dipping tones have in common. This study gives further information that the high-level and the falling tones are acquired earlier than the rising tone, and that the correct tonal system is acquired relatively quickly and is mastered well in advance of the segmental system.

Clumeck, in the study of the acquisition of tonal contrasts of Mandarin, reports that his subjects 'seemed to be responding randomly on the rising vs. low-dipping distinction.'

It is claimed that 'rising tones are more difficult to perceive and to produce than level and falling tones' (Li and Thompson, In press, and those cited in Li and Thompson, In press, e.g. Kirilloff, 1969; Ohala, 1973; Ohala and Ewan, 1973; Sundberg, 1973; Tse, 1973; Hombert, 1974, 1975). It is, therefore, interesting to investigate whether this statement is valid in the acquisition of the rising tone of the Thai child studied in this thesis.

'Proto-Language'

Investigators and parents have found that in the course of language development there is a stage when children use non-verbal vocalizations, generally accompanied by gestures, i.e. 'proto-language' (Halliday, 1975), in conveying 'meanings'. Lewis noted

that his son used early sounds [a a a, ε ε ε] instrumentally in various circumstances (cf. Lewis, 1936: 305). Halliday (1975) reports a meaning system acquired by his son from about 9 months old. In this case different 'functions' were conveyed by different levels of pitch and by gestures. Dore et al. (1976) observed that the children studied produced phonetically consistent forms which appeared to be intermediate between prelinguistic babbling and words. Carter (In press) reports that certain gestures used by her subject were found to be tied to certain sounds and certain functions. She has also described the development of some of these early forms into words of the conventional language (Carter, 1975). Ferrier (In press) states that her daughter used 'proto-language' for her 'demands' before the one word utterance stage. The 'proto-language' is reported to be used by Japanese and American children studied by Nakazima (1972:1).

The 'proto-language' is also found in children in tonal language environments, i.e. Thai (cf. details in this thesis) and Mandarin. Clumek (personal communication, 1975) said that his subject used different levels of pitch in conveying certain 'meanings' (cf. p. 100 in this thesis.).

Adult-Child Interaction and Adult Language Addressed to Children

The view that the internal factor, i.e. cognitive development, and external environmental factors, i.e. social interaction in relation to environment, are basic in the language development, has been supported by recent researchers, and a vast diversity of studies on

this point have been carried out. Bullowa et al. (1964) studied the language development of babies in a natural home situation from birth to the 'verbalization' stage. The mutual influence of the mother's and the child's speech pattern in the course of the child's development from vocalization to verbalization has also been taken into consideration. It has been observed that not only does the mother's vocalization influence the child's, but also the child's 'baby talk' influences the mother's speech. Snow (1976) who studied the development of conversation between a pair of mothers and their babies from the very early stage, i.e. 3 months to 18 months, reports that the mothers treat their babies in a way well designed to induct them into the conventions of social intercourse. In addition to interaction in 'conversation form', the 'intersubjective form of the exchange between mother and baby which appears in the temporal congruence of their action, in mirroring and in the complementarity and reciprocity of behaviour' has been found in the study by Sylvester-Bradley and Trevarthen (In press).

The ways mothers and other adults speak to children have been found to differ in many respects from adult-to-adult speech. The modifications of adult speech when addressing children are found in prosodic features as well as in the systems and structures of phonology and syntax, and have been described, for instance, for English (cf. Ferguson, 1964; Garnica, In press; Snow, 1976), and for Latvian (cf. Ruke-Dravina, In press). Surveys of the various aspects of the language spoken to children can be seen in Farwell (1973) and Snow (In press).

This thesis deals primarily with babbling and its transition to speech. The way adults interacted with the child is relevant and this is therefore also described. An attempt is made to provide some answers to the questions mentioned in the survey.

Aims of the study

The present thesis is based on a longitudinal study of the speech development of a Thai baby boy, the writer's nephew, from the age of 3 months to 18 months. It is believed that the investigation of the child's whole language development is more fruitful if the investigator follows the development from the earliest possible stage of vocalization to the meaningful utterance stage. Thus the analysis of the present study starts as early as 3 months when the baby's vocalizations are barely identifiable, and ends at 18 months when two and three word utterances appear.

The study presents a picture of how speech emerges from early vocalizations and when and in what way language specific features appear. Thus answers to the problems and questions raised earlier are offered. Also an attempt is made to give a pre-phonological description of babbling, proto-phonological description of the proto-language, and a phonological description of one word utterances, using Prosodic Phonology as the theoretical basis. An account is also given of the relationship between the adult models and the baby's forms, as well as of adult-baby interaction, and adult language addressed to the baby.

To the best knowledge of the writer of this thesis, no such detailed longitudinal study has yet been made of the acquisition of phonetics and phonology in relation to the above points for Thai or any other language. This work, therefore, is offered as a contribution to what has so far been a neglected area of language acquisition.

As few studies have been done on the acquisition of tones in tone languages, and none on the acquisition of tones in Thai, this work also provides new information in this particular aspect of child language studies.

Since the child acquires language in a social environment, the following assumptions for this study are made: firstly, language acquisition is closely related to cognitive development, and it takes place through the child's interaction with others in relation to the environment; secondly, the child creates a language system of his own; he does not use a reduced version of the adult system, and his system gradually changes as his cognitive development progresses.

The description of the study is centrally concerned with production in relation to extra-linguistic factors such as environment, context of situation, and social interactional context, and the focus is on the phonetic and phonological development. Some indication of adult-baby communicative interaction is also given. The psychological processes of language acquisition, however, are not the concern of this thesis.

Method of collecting data

The material in this longitudinal study was collected in a natural home situation by recording. The tape recorder was a National Panasonic cassette recorder, model R.Q.443 S with a built-in microphone. A total of 27 cassettes was collected. The first 16 were BASF compact-cassette C120; the other 11 were SONY compact-cassette C90.

During the period of 3-12 months, the recordings were made daily; from 12-18 months, the recordings were made twice a week. The time for each recording was not restricted, and varied between 5 minutes to half an hour. Throughout the 15 month period, the recordings were made in various contexts of situation: feeding, playing, bathing, potting (the child rarely vocalized in this situation), bed time, after waking up, etc. There were a few gaps in recording, e.g. when the family went on a holiday, when the child was ill, or when the machine had broken down.

The baby's vocalizations were recorded by whichever member of the family was available, i.e. his parents, and his grandmother. The recorder was hidden near the baby's cot and his play bed during the day, and near the cot at night. The machine was also moved around to where the child was being attended to or played with, e.g. in a bathing situation, it was taken to the bathroom, etc. It may be expected that the data collected are representative samples of the baby's vocalizations and speech since they were collected in a natural home situation, and the members of the family who did most of the recordings are not linguists and did no experimental testing or eliciting of any kind.

Before the actual tape-recording was begun, i.e. the period from birth to the end of the second month, the child's father kept a record of the baby's vocalizations in diary form using the conventional language and orthography for the description. When the recording began, the adults always gave the date and time, and commented on the situation; sometimes the situations and contexts were clear from their natural conversation.

During the period of 8-11 months, the writer stayed with the family and did the recordings herself. Additional linguistic activity which took place when the recorder was not available was noted down in phonetic transcription. She also kept a detailed account of the child's general development during that period. It was a useful period for the writer to make her own observations as it was the time when the proto-language (cf. Halliday, 1975) was widely used by the child, and when the first verbal attempts were made.

The child himself was not aware of the presence of the recording machine until he was about 8 months old when he appeared to pay a great deal of attention to objects in the environment and to the sounds he heard. He often tried to 'investigate' the recorder when the adults were out of sight. A few times, as a result of such an investigation, the machine broke down. At around the age of 12 months, the child appeared to assume that the recording machine was an object which had to be used in conjunction with his speech and activities. Several times when he was about to 'read' or 'play' or 'speak', he pointed to the recording machine to 'check' if it had been started. The adult had to inform him that it had been pressed, otherwise he

would not speak. The recording machine, therefore, was part of his 'things' that he asked for in the same way as he asked for his hat when he wanted to go out.

The child and the adults

The subject of the study is a full-term boy, the first child of professional parents - a nurse and an engineer. He was born on the 25th of October, 1973; and is now 3 years and 1 month (November, 1976). His pet name, by which he is called in the family, is Pui [pui]. During the time of data-collection, the family lived in Lampang, the north of Thailand; they now live in Bangkok.

All members of the family speak Bangkok Thai to each other and to the baby. The baby's parents speak only the standard Bangkok Thai of their generation. The baby's grandmother speaks her own dialect, the Surathani dialect spoken in Surathani, south of Thailand, and also Bangkok Thai, but with slight interference in some consonants from her dialect. However, the tones and vowels are those of Bangkok Thai. (The interfering features of the grandmother's speech will be discussed later.)

In addition to the members of the family mentioned above, Porn, a lady cleaner, who came during the day, occasionally helped with the baby. Porn speaks Bangkok Thai to the baby and to the family, but with some interference from features of the Lampang dialect (north of Thailand). Thus, the only language the baby was exposed to was Bangkok Thai, but with the addition of two other dialect accents.

In order that readers not familiar with the Thai language could follow the description of the acquisition of Thai phonetics and phonology by the baby, a brief outline of the phonetic and phonological systems of the Thai language is given below.

Outline of the phonetic and phonological systems of the Thai language

(IPA symbols and tone marks are used here.)

The phonetic structure of the Thai language is based primarily on the monosyllabic, i.e. CV or CVC. A high proportion of words is monosyllabic, the rest are polysyllables and compounds. The polysyllables and compounds are separable in isolation into a sequence of syllables, each of which fulfils the requirements for the structure of monosyllables.

The disyllables are distinguished from the compounds in that the form of the disyllabic word is divided into 2 parts - the first syllable which is meaningless in isolation, and the second syllable which may or may not be meaningful; it will make sense only if the two syllables are put together. The compound word is a word of more than one syllable, say two for example, whose component syllables are meaningful in isolation. The meanings in combination, however, are different from the isolative meanings, e.g. [phi: \s uə] 'butterfly', but [phi:] 'ghost' and [\s uə] 'blouse'.

A sentence consists of any one of the word forms mentioned

above with grammatical constraints.*¹ In speech, there are some modifications in structures larger than monosyllables. For further details in pronunciation of such modifications see Henderson (1970) and Tuaycharoen (1974).

The different types of consonants and vowels are given in the general phonetic forms and are shown in Tables 1, 2, 3 and 4. Tables 1 and 2 show the distribution of the consonants.

Table 1. Initial consonant types

	Labial	Labio-dental	Alveolar	Palatal and Alveolo-palatal	Velar	Glottal
<u>Plosives</u>						
vl. unasp.	p		t		k	ʔ
vl. asp.	ph		th		kh	
vd. unasp.	b		d			
<u>Affricates</u>						
vl. unasp.				tʃ		
vl. asp.				tʃh		
<u>Fricatives</u>		f	s			h
<u>Liquids</u>			l r			
<u>Nasals</u>	m		n		ŋ	
<u>Semivowels</u>	w			j		

vl.= voiceless; vd.= voiced; asp.= aspirated; unasp.= unaspirated

In the initial position the following consonant clusters also occur: [pl-], [pr-], [phl-], [phr-], [tr-], [kl-], [kr-], [kw-], [khl-], [khr-], [khw-].

*¹ See Panupong, 1970, for further details.

The liquid [l r] contrast, in colloquial style, is not always clearly produced. (For this matter see also the discussion in Abramson (1962).) In clusters, the non-contrastivity still occurs, or alternatively, neither [l] nor [r] is heard.

Table 2. Final consonant types

	Labial	Alveolar	Velar	Glottal
Stops	p	t	k	ʔ
Nasals	m	n	ŋ	

All final stops are unexploded.

Table 3. Vowel^{*1} types

Front		Back			
		Unrounded		Rounded	
Long	Short	Long	Short	Long	Short
i:	i	u:	u	u:	u
e:	e	ɔ:	ɔ	o:	o
ɛ:	ɛ			ɔ:	ɔ
a:	a				

*1 For acoustic measurements of vowels in Thai see Abramson, 1962.

Open syllables with a short vowel, i.e. C[̣]V, are followed by a glottal stop, i.e. C[̣]Vʔ. However, the absence of the glottal stop in such a place is possible in longer stretches of utterance.

The diphthong glides which are functional are shown below in Table 4.

Table 4

i:ɛ iu	u:ə	u:ə ui
e:u eu	ɤ:i	o:i
ɛ:u		ɔ:i
a:i ai a:u au		

The triphthong glides which are functional are shown in Table 5.

Table 5

iəu	uəi	uəi
-----	-----	-----

Tones^{*1}

There are 5 tones in the Thai language: low (low-fall), mid, high, falling (high-fall), and rising (low-rise).

*1 It has to be noted that in speaking, each tone produced by different speakers is not necessarily exactly the same; a slight modification usually occurs. Acoustic measurements of the tones in Thai from samples of Thai speakers can be seen in Abramson, 1962 and Erickson, 1974.

As in the case of some other tone languages, the tones in Thai are phonologically constrained, i.e. in relation to syllable structure and vowel length. The phonological rules for the tones for different syllabic structures are given below: (ṽ = short vowel, ṽ̄ = long vowel).

1. Cṽ̄ can occur with any one of the 5 tones: low, mid, high, falling, and rising, e.g.

[-pha:]	'to take'
[-pha:]	'to split'
[-phra:]	'scythe'
[\pha:]	'cloth'
[/pha:]	'cliff'

2. CṽN (where N = nasals) can occur with any one of the 5 tones, e.g.

[-lom]	'wind'
[-lom]	'bog'
[-lom]	'to fall'
[\lom]	'to sink'
[/lon]	'to simmer'

3. CṽS^{*1} (where S = stops :p t k ?) occurs with low tone and high tone only, e.g.

[-sɔʔ]	'to find'	[-sɔʔ]	'to erode'
[-wat]	'a cold'	[-wat]	'to measure'

4. CṽS^{*2} (where S = stops :p t k ?) occurs with low tone and falling tone only, e.g.

[-kha:t]	'to be torn'	[\kha:t]	'to estimate'
[-sɛ:k]	'to part (hair)'	[\sɛ:k]	'to insert'

*1,2 In some loan words, onomatopoeia, and sentence particles with the CṽS structure, the falling tone may also occur; those with the CṽS may occur with the high tone.

Phonetic description of dialectal interference in the speech of the child's grandmother

As mentioned earlier, the child's grandmother speaks Bangkok Thai with slight interference from some consonants of her dialect, the Surathani dialect.*1 These consonants are [f] [s] [ɲ] in the initial position.

[f-] is always produced by the grandmother as [khw-]
or [k^h_ɲ-]*2

[s-] is always produced as denti-alveolar with slight retroflexion instead of the standard Thai alveolar articulation.

[ɲ-] is sometimes produced as [h̃]

Moreover, all voiceless aspirated plosives appear to be produced with only slight aspiration.

It was expected that the consonant features described above would have an effect on the child's speech in the later period (cf. p. 210).

*1 For the comparison of tones in Bangkok Thai (standard Thai) and in the Surathani dialect, see Tuaycharoen, 1974.

*2 It has been pointed out by Henderson (1964) that initial [f] in Thai is frequently 'dark' in quality, i.e. velarized. This makes [f] and [khw] phonetically more similar than the transcription suggests. The fluctuation between [khw] and [f] in the Surathani dialect and in Bangkok Thai may be historically linked since in another dialect of the south, i.e. Songkha dialect, there is also a fluctuation between initial [khw] and [f].

Method of analysis

As the basic field material was recorded on a cassette machine at the slow speed of $1\frac{7}{8}$ inches per second, and as a cassette machine is difficult to operate when the recordings have to be listened to over and over again, it was thought desirable to transfer the material to open-reeled tapes at a higher speed, so that more sophisticated play-back equipment could be used for the analysis. It was of course not possible to suppress the large amount of background noise present on the original cassette (which prevented more detailed acoustic analysis of most of the material) but the higher quality reproduction of the open-reeled play-back machine made the analysis easier, though it was not ideal. For all this analysis, a REVOX (Swiss) tape recorder was used, instantaneous in stop and start facilities and of a very high reproductive capability.

As pointed out by Johnson and Bush (cf. Johnson and Bush, 1971), there are several problems concerning data-collection and transcription. In transcribing the data of the present thesis, the writer used some of their suggestions, i.e. the IPA symbols were used as they are generally accessible to linguists. The transcription was intended to be as narrow as possible, so the IPA diacritics were also used to give greater detail. In addition, a number of symbols and diacritics were made up to represent what has not been symbolized in the IPA system (see glossary of notations p. 25). It has to be noted that the values of the symbols used in this analysis do not have precisely the same qualities as when used to represent the sounds of adult speech

because of babies' vocalizations being unclear and imprecise.

Most of the data collected were transcribed, and were re-checked before the analysis was made. However, in a repetitive situation where there was no significant change in the baby's vocalizations, and in cases where the vocalizations were unclear and untranscribable, transcriptions were not made. Such stretches of recording comprise less than a quarter of the total.

All the acoustic analyses, for pitch in particular, were made with the aid of a pitch meter and a mingograf. The range of the pitch meter is between 60 Hz and 450 Hz. Therefore, it tends to produce the fundamental frequency only, as the restricted range does not allow the harmonics to interfere with the display to any great extent.

Theoretical basis for the analysis

In the present thesis, an articulatory feature analysis is used for the phonetic description, and prosodic analysis for the phonology, similar to Waterson's approach in her analysis of early childhood speech (cf. Waterson, 1971). Prosodic analysis was chosen as the theoretical basis for the analysis as it is best suited to handle the problems that arise in dealing with babbling and early child utterances.

In linguistic study, linguists appear to have agreed that two entire different types of relation, namely paradigmatic and syntagmatic, exist between the linguistic elements at all levels. It is believed that 'linguistic units have no validity independently of their paradigmatic and syntagmatic relations with other

units' (Lyons, 1968). Yet, aside from the Firthian School of Linguistics, hardly anyone seems to have brought into consideration this fundamental principle at the phonetic level and seldom at the phonological level. Phonemicists seem to have been mainly concerned with segments and seem to have neglected the significance of syntagmatic relations. Thus, a stretch of sound is analysed into units, which are either segmental or suprasegmental and no phonetic relation is stated to exist between them. The result of such a method is a description which puts emphasis on the paradigmatic relation and has little consideration for the other dimension, namely the syntagmatic.

The linguistic material for this thesis was analysed, both phonetically and phonologically, on the basis of the whole stretch of vocalization and the unit of the analysis is the syllable. It would be unnatural to analyse a baby's vocalizations and early utterances in terms of 'phonemes' since it is not valid at this stage to assume that the child acquires distinctive segmental contrasts or phonemes in the adult sense.

Elements of the phonological analysis

The aims of prosodic analysis in phonology is not that of transcription or unilinear representation of languages, but rather a phonological analysis in terms which take account not only of paradigmatic relations and contrasts, but also of the equally important syntagmatic relations and functions which are operative in speech (cf. Robins, 1970: 191).

The phonological analysis is stated by means of certain elements which are set up for this purpose. The elements^{*1} are syllable, phonematic units and prosodies.

The syllable has status at both phonological and phonetic levels. The phonetic syllable and the phonological syllable do not always correspond exactly. The structure of the phonological syllable is stated in terms of phonematic units and prosodies.

Phonematic units^{*2} are phonological elements having phonetic exponents which may be referred to a given place in the syllable. Phonematic units are of 2 kinds, Consonantal unit and Vocalic unit, which will be referred to as C and V units. There is, in addition, a phonological vocalic onset unit, \mathfrak{D} , (schwa).

Prosodies (cf. Firth, 1970) are phonological elements having phonetic exponents which either extend over more than one place in the structure or have implications over more than one place in the structure in that they delimit a structure from preceding and following structures. Prosodies may be stated for a syllable as a whole or some part or parts of a syllable.

*1 All these elements are elements of the phonological analysis and must not be confused with elements established at another level of statement, viz. phonetic.

*2 Phonematic units cannot be identified with the usual 'phonemes' set up to handle the phonological analysis of other theoretical bases (see Allen, 1954:556), nor are prosodies to be equated with the supra-segmental phonemes of 'phonemic' phonological analysis. There will be, of course, some similarity between the phonetic exponents of these two pairs of phonological categories, but since the systems of which they are members are different, any attempt to make one to one identification is bound to be misleading.

Syllable structure

The structure of the syllable will be described first in terms of C and V and \emptyset , and then in terms of the phonematic contrasts at the C and V place, and the prosodies. Different systems are set up at different places^{*1} in structure, e.g. at initial and final places.

In the analysis in this thesis, a syllable may comprise V alone, e.g. those treated in the early stages of vocalization, or a V unit that is preceded and/or followed by a C unit, e.g. CV, VC, CVC; a \emptyset syllable can only occur in a disyllabic structure, e.g. \emptyset CV, and \emptyset CCV.

Thus, it will be seen that every syllable has a V unit or V with one or two C's, but not every syllable has a \emptyset unit.

*1 This is in marked contrast with a phonemic phonological analysis in which an overall system is set up. For example, in such an analysis two phones not in complementary distribution at one point in the structures are assigned to two different phonemes, and this distribution is maintained even at those points in the structure where no contrast exists and the two phones are in complementary distribution. The treatment adopted in this thesis, however, would set up different systems for the two places in the structure. It is polysystemic, whereas the phonemic treatment is monosystemic.

Glossary of notations and terms

Notations

In addition to the IPA symbols, the following notations, which appear in the examples illustrated at each stage, have been invented for the purpose of this study. They are as follows:

Tone marks. The IPA tone marks are used, but with a slight modification:

[₋ a]	low tone
[⁻ a]	mid tone
[^ˉ a]	high tone
[\a]	falling tone
[/a]	rising tone

Phonetic notations

bb	represents labial tap
bbb	" voiced labial trill
ppp	" voiceless labial trill
bl	" voiced labial liquid
tl	" voiceless alveolar liquid
ml	" labial nasal liquid
~~	" creaky sound
↓	" ingressive air-stream mechanism (cf. Abercrombie, 1967:24)
<	" increase of loudness

Non-phonetic notations

| a |	the vertical lines indicate the boundaries of a stretch of utterance
| a | b |	sequence of stretches of utterance without a pause

| a | b | | c |

sequence of stretches of utterances 'a' and 'b', interrupted by a short pause, and followed by stretch 'c'

| a | pause | b |
| a | , | b | , | c |

two stretches interrupted by a long pause
selected examples of stretches which are not necessarily continuous.

| a | -
- | b |

sequence of stretches 'a' and 'b' carried over from one line to the next

hp a

stretch produced with high pitch register

np a

stretch produced with normal pitch register

| a | a | a | a | a |
| - | \ / | - |

the straight and curved lines underneath the transcription, i.e. a's in this notation, represent pitch contours, e.g. in this notation, the pitches are mid, high, falling, rising, and low respectively.

| a | a | a |
| - | ^ | - |

the dot at the start of the straight or curved line represents syllable accentuation

[:]

two dots following a consonant symbol, e.g.

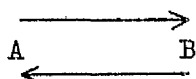
[ad;na], represent length of held contact.

The phonological notations are glossed in the stages in which the phonological statements are made.

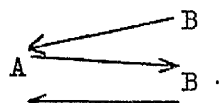
Form of dialogues

In the 'dialogues' between the adult and the baby, the adult's utterances are given on the left hand side of the page, the baby's on the right. When the utterances of both the adult and the baby appear on the same line, it implies that the adult produces the

utterance first, and the baby responds, e.g.



In the case where the baby initiates the 'conversation', the baby's utterance will be given first on the right hand side of the page, after that the interaction follows the pattern mentioned above, e.g.



Most of the meaningful utterances are translated into English. A bracketed word in the translation shows the omission of the form in the actual speech, e.g.

|	bɔ:k	arai	a	lu:k	|
	-	-	-	~	

'What are (you) telling (grandma), baby?'

Terms

1. Stretch. A stretch is an utterance followed by a pause of silence.
2. Vocalization. This term refers to any vocal sound pattern with no evidence of language specific contrastivity, e.g., babbling, coo, cries, vocal-play etc. (cf. Crystal, 1973:5).
3. Checked vocalization. Checked vocalizations are utterances which are produced with a stricture of open approximation (vowel) and are interrupted by a stricture of complete closure, e.g. [appa], [aɪtʃa]; or they may start with a stricture of complete closure, e.g. [pa], [tʃa].

4. Non-checked vocalization. Non-checked vocalizations are utterances which are produced with a stricture of open approximation (vowel) and are interrupted by a stricture of close approximation (fricative) or of open approximation (semivowel), e.g. [aʏ̥]; or they may start with such strictures, e.g. [β̥], [wa:].
5. Verbalization. This term refers to any sound pattern which shows a recognizable attempt at the language.
6. Pitch. Pitch is related to the frequency with which the vocal cords of the speaker open and close during the utterance (cf. Abercrombie, 1967:27).
7. Tone. Tone is related to the functional distinction carried by the pitch of each lexical item in the language.

SECTION I

Phonetic and Phonological Development: from Babbling to Speech

Stages in development

The vocalizations during the age of 0;3.0 - 0;18.0 months are divided into 10 stages on the basis of phonetic changes, i.e. there is progress in the acquisition of phonetic features in each stage. The 10 stages are described under the following chapters:

Chapter 1 Early babbling:

Stage I (0;3.0 - 0;3.22)

Stage II (0;3.23 - 0;4.19)

Chapter 2 Later babbling:

Stage III (0;4.20 - 0;5.15)

Stage IV (0;5.16 - 0;7.20)*1

Chapter 3 The proto-language:

Stage V (0;8.0 - 0;10.15)

Stage VI (0;10.16 - 0;11.12)

Chapter 4 The one-word utterance stage:

Stage VII (0;11.13 - 1;1.02)

Stage VIII (1;1.03 - 1;2.24)

Stage IX (1;2.25 - 1;3.23)

Chapter 5 The start of two and three word utterances:

Stage X (1;3.24 - 1;6.0)

*1 Data from 0;7.21 - 0;7.30 are not available.

Brief outline of language development

A brief outline of the language development of the baby under study is given before the vocalizations of each stage are described.

The language development of the subject in the present study proceeded along the lines described as typical for many children, i.e. from babbling to 'proto-language', to one word utterances, and then on to two and longer utterances respectively. The early babbling (Stages I-II) is a fluid flow of vocalization. The later babbling (Stages III-IV) is more strongly articulated with recognizable syllable patterns. The 'proto-language' (Stages V-VI) is the period when the use of a limited set of short vocalizations with specific functions occurs.

When it comes to the one-word utterance stage (Stages VII-VIII-IX), in addition to the phonetic and phonological development, there arises the acquisition of word meaning and the application of word meaning to new referents. For such matters, the analyses based on 'perception' (cf. Clark, 1973), on 'function' (cf. Nelson, 1974), on 'proto-type' (cf. Bowerman, In press), on 'imitation' and 'generalization' (cf. Ferrier, In press) would be useful. At the longer utterance stage (Stage X), the problems of grammar and semantics also arise and could be investigated along the lines used for English by, for instance, Bloom, 1970; Braine, 1963; Brown and Fraser, 1964; Miller and Ervin, 1964. However, these questions are beyond the scope of this thesis and are therefore not considered here.

The description of each stage will be given in the following order:

1. Phonetic development of vocalizations in general.
2. Vocal play.
3. Relationship between the adult models and the baby's forms.
4. (Pre-), (Proto-), Phonological description.

Chapter 1

Early Babbling

Stage I (0;3.0-0;3.22)

General phonetic description

Vocalizations early in Stage I (0;3.0-0;3.18)

In this stage, the baby's vocalizations were 'fluid', consisting mostly of vowel-like sounds. Variation from open to close and from close to open in various sequences was observed. There was also variation from front to central and back. The vowel-like sounds which were produced in this stage were combinations of features as follows:

	Closeness	Openness
Frontness:	[e]	[ɛ][a]
Centrality:	[ɨ]	[ə]
Backness:	[ɯ][ʊ][ɤ]	[ɔ]

The vowel qualities in the close front position as [i] and in the half close back position as [o] did not occur at this stage.

The vocalizations, which were mainly made with an open passage of the air-stream (vowel-like sounds), were sometimes interrupted by strictures of close approximation and of complete closure (consonant-like sounds). At the early period of Stage I consonant-like sounds with which the vowels were interspersed were labial, velar, and glottal friction, e.g. [pʊ], [ɣʊ], [hɨ], and those with stricture of complete closure made at the velar and glottal places, e.g. [ɛ^k], [ʔa:g]. Voicing generally continued through-

out the sequence of utterance, but was sometimes interrupted by pauses of silence and by breathy articulation. Glottal constriction and breathy articulation, e.g. [ʔ̤], [h̤], were consistent features in the baby's vocalizations in this study and have been noted in studies of English babies (Stark et al., 1975).

In the later period of this stage, vowels were also interspersed with strictures made at the lips, e.g. [w] [m] [p] [b] [pp̤] [bb̤]; at the alveolar place, e.g. [n] [l̤]; at the palatal place, e.g. [ɟ] [j̤], and at the velar place, e.g. [ŋ] [ŋ̤]. However, they were articulated vaguely and imprecisely.

Thus, the elements within a stretch^{*1} were accompanied by any one of the three kinds of strictures:

1. Stricture of open approximation: vowel-like sounds as in

| ɛ̃ |	| ɛ̃ : ɛ̃ |	| ɛ̃ : ɛ̃ |	| ɛ̃ : ɛ̃ |
-	/	-	\

2. Stricture of close approximation, as in

| ɣũ : |	| h̃ |	| ɣũ ɣ̃ |
/	-	

In the above type, each stretch consisted of two kinds of stricture, i.e. close approximation and open approximation

3. Stricture of complete closure, as in

| ɛ̃ʔ |	| ɛ̃k ^h |	| , |	| ɣũ : ɣũ |
			/ \

*1 Cf. glossary of terms.

Phonetic description of successive stretches

A stretch of vocalization occurred individually or successively or interrupted by a long pause. To give a general picture of the baby's vocalizations in the early period of Stage I, a phonetic description of the first five stretches of the data which are typical are described below:

For example:

$\left| \begin{array}{c} \tilde{\pm} \\ - \end{array} \right|$	$\left| \begin{array}{c} \tilde{\pm} \tilde{\pm} \\ \smile - \end{array} \right|$	$\left| \begin{array}{c} \epsilon \epsilon \\ \smile \end{array} \right|$	$\left| \begin{array}{c} \tilde{\epsilon} : \tilde{y} \tilde{u} : \\ - \end{array} \right|$	$\left| \begin{array}{c} \pm : \tilde{u} : \\ - \smile \end{array} \right|$	$\left| \begin{array}{c} \epsilon \tilde{u} : \\ \smile - \end{array} \right|$
--	---	---	---	---	--

(1) (2) (3) (4) (5)

The baby started his vocalizations softly in the first stretch with open approximation accompanied by closeness and centrality features, i.e. $[\pm]$, and nasalization, on a mid pitch. The same features extended to the next stretch with long and short length on a rising and then mid pitch respectively. These were followed by open approximation with a successive occurrence of frontness and openness of different lengths, i.e. $[\epsilon : \epsilon]$, on a falling pitch. Nasalization was absent when the change from closeness to openness took place, and the loudness of vocalization increased. The same front, open quality extended to the stretch which followed, but with high pitch and nasalization. The openness feature was followed by velar friction, $[\gamma]$, which was followed by closeness and backness features with rounding quality, and with long length, i.e. $[\tilde{u} :]$. Nasalization was absent, and the pitch was mid. In the fourth stretch, the closeness and centrality features, $[\pm]$, occurred again on a mid pitch. The closeness and unrounding were prolonged to the back area resulting in $[\tilde{u} :]$, which occurred

on a falling pitch. The fifth stretch was begun with frontness and openness, [ɛ], on a rising pitch; the pitch stayed high and the openness was prolonged to the back area and accompanied by rounding resulting in the quality [ɔ̞]. Then there was a move to a close position still with backness and rounding, [u̞], and this was prolonged on a mid pitch. This was followed by an off-glide to a velar closure which was heard on a high pitch, and the release of the closure was inaudible.

From the description given above, it could be said that at this stage, the baby's vocalizations were random, but the features of the sounds were confined to three kinds of stricture, to closeness and openness; frontness, centrality, and backness, and to pitch of different levels.

Repetition of vocalization

It appeared that within each stretch of vocalization, there were repetitions of two kinds: full repetitions and partial repetitions.

The full repetitions were the vocalizations within a stretch whose phonetic features, i.e. vowel qualities, pitches, strictures, were the same, e.g. | hɛ? hɛ? |.

However, this kind of repetition rarely occurred in this stage. The occurrences of partial repetitions, those which shared at least one phonetic feature, were greater. For example,

|	ĩ:ĩ	ε:ε	|	,	hĩ	hĩ	hə	|	,	Yũ ⁺	Yũ ⁺		,	ẽ	ẽ	ẽ	|
	/	-	˘			˘	-			-	-			-	-	-	

The continuations of vocalization from one stretch to another were variable among the ones described above. It was difficult to predict which sound would follow another. Nevertheless, it might not be mistaken to say that the vocalizations of the stretches that follow usually share at least one feature with those of the preceding ones. (Cf. example 2.1, Appendix 2).

Nasalization

The nasalization of the vocalizations in this stage was unpredictable. It went over the whole stretch or over some elements only. It seems that there was a tendency for the velum to be involuntarily raised and lowered during the baby's vocalizing. Nasalization in the vocalizations of this baby occurred both when he was happy and unhappy. (Cf. example 2.2, Appendix 2)

Lip positions

The sounds produced by the baby in this stage were neither closely rounded nor widely spread. They tended to be neutral or slightly protruding. As in the case of nasalization, the lip-rounding in this stage continued throughout the whole stretch or over some elements only. (Cf. example 2.3, Appendix 2)

Pitch

Pitch in this stage had a great variety of possibilities, i.e., mid, low, high, falling, rising and rising-falling. Generally the occurrences of mid, low, and high were greater than that of the rest. Variation in pitch made rhythmic groups; the change of pitch direction was unpredictable. However it was noticeable that

at the end of almost every stretch, the pitch level appeared to be lowered or there was a change of pitch direction, i.e., falling or rising. The observation of lowering or changing of pitch direction seems to be in agreement with Lieberman's study of intonational signals observed in the cries of newborn infants (Lieberman, 1967).

Pitch plays an important role in the present study, since the acquisition of pitch^{*1} or eventually 'tone'^{*2} of the language is as important as consonantal and vocalic elements. An attempt to divide early babbling into syllables has been made on the basis of the changes of pitch for it is difficult to delimit syllables on the basis of consonantal and vocalic elements as is usually done in the adult system. This is because the early babbling is so 'fluid' and 'vague'.

Vocal play

Vocal play is the vocalizations which were produced by the baby when he was on his own. The general phonetic description of the vocalizations, therefore, applies also to that of vocal play.

The baby appeared to practise the sounds he had regularly produced. Sometimes crying-like sounds were also practised in his vocal play. In this study, it happened that when the baby was producing crying-vocal play his mother was not always sure whether he was crying or happy. The writer herself observed this baby (when he was between 8-9 months old) emitting crying-like sounds while he was smiling.

*1, 2 See glossary of terms.

The presence of nasalization has been said to be associated with the unhappy state (Lewis, 1936), but it may be a mistake to distinguish the happy state from the unhappy state on the basis of the presence of nasalization. However, until more studies are made on the babbling of Thai babies, it is not possible to say whether the use of nasalization in the happy state and in the unhappy state of the baby studied was idiosyncratic or if this is typical of Thai babies.

Vocalizations in the later period of Stage I (0;3.19-0;3.22)

In the later period of Stage I, the vowel-like sounds were still confined to those of the baby's repertoire mentioned earlier. However, there was progress in that a diphthongization of openness to closeness, [aɪ], and the glides [w][j][ɹ] appeared.

The consonant-like sounds either with strictures of close approximation or complete closure were produced more frequently than earlier. In addition to [h][ʔ][ɣ][g][p], now [w][m][p][ɸ][ɳ][ʒ]^{*1}[j][ɲ] appeared. These sounds are to be discussed below.

[w] occurred in some syllables as a result of the rounded back articulation, i.e. the rounding of the lips, being prolonged before the next sound was produced, as in

u ⁺ w	ɸuɪ	ʔe	or	eu ⁺ w	ɛ:ɛʔ
—	—	—		—	—

*1 It is difficult to distinguish [ʒ] from [ʒ], therefore the symbols [ʒ] [ʒ] used in this study merely represent friction in the palatal area.

[m]. The closure of the lips was made while the velum was lowered; the air-stream escaped through the nasal passage without the release of the closure, as in $\left| \begin{array}{c} m::: \\ \sim \end{array} \right|$.

[p] as in $\left| \begin{array}{c} ?\alpha^p p\varepsilon \\ \sim \end{array} \right|$, long duration of labial closure was made

before the open release.

[ɲ] occurred as a syllabic onset of a palatal vocalization. This sound, however, occurred only once in this stage, e.g.

$\left| \begin{array}{c} \text{apppu}^{\text{t}} \text{j}^{\text{t}} \tilde{\varepsilon} \\ - \end{array} \right| \left| \begin{array}{c} \text{ɲj} \\ \text{3\varepsilon} \\ - \end{array} \right|$.

[ɲ]. The articulation for [ɲ] was more clearly heard than that of [ɲ], and was produced more frequently, e.g.

$\left| \begin{array}{c} \tilde{\varepsilon}^{\text{t}} \text{pppu}^{\text{t}} \text{n} \tilde{\varepsilon} \\ - \end{array} \right|$.

[ʒ] occurred with a preceding palatal glide [j], e.g.

$\left| \begin{array}{c} \text{j} \text{3}^{\text{t}} \text{u}^{\text{t}} \varepsilon \\ \sim \end{array} \right|$, $\left| \begin{array}{c} \varepsilon \text{y}^{\text{t}} \text{j} \text{3}^{\text{t}} \text{a} \\ - \sim \end{array} \right|$, $\left| \begin{array}{c} \text{ɲj} \text{3}^{\text{t}} \varepsilon \\ - \end{array} \right|$.

[j] sometimes occurred as a glide caused by the movements of the tongue from one position to another: from central to more back position, as in $\left| \begin{array}{c} \varepsilon \text{a}^{\text{t}} \text{j}^{\text{t}} \text{u}^{\text{t}} \text{?} \tilde{\varepsilon} \\ - \sim \end{array} \right|$, i.e. from [ɛ] to [u],

from more back to front as in $\left| \begin{array}{c} \text{u}^{\text{t}} \text{w} \varepsilon \text{?} \\ - \end{array} \right|$, i.e. from [u] to [w],

and from back to a more forward position as in $\left| \begin{array}{c} \text{apppu}^{\text{t}} \text{j}^{\text{t}} \tilde{\varepsilon} \\ - \end{array} \right|$,

i.e. from [u] to [ɪ]. Sometimes [j] occurred as an onset glide before [ʒ] was produced (see examples under [ʒ]).

[ɤ] occurred in connection with nasalized vowels. It was a glide of the tongue movement from a back position to a front or a more forward one, e.g. $\begin{array}{|c|} \hline \text{ũ}^{\text{ɤ}}\tilde{\epsilon} \\ \hline - - \\ \hline \end{array}$, $\begin{array}{|c|} \hline \text{apppu}^{\text{j}}\tilde{\epsilon} \\ \hline - - \\ \hline \end{array}$.

[ɤ] in this period was vaguely articulated.

As time went on the palatal glide [j] occurred increasingly in the baby's vocalizations. The palatal glide first appeared as a linking feature from one vowel position to another, then made a link between a vowel and a consonantal sound; later the palatal was more strongly articulated and occurred as an onset of a syllable.

It also happened that in a stretch where rounding was present, the lip-rounding was prolonged making a link with the next sound. The rounding of the lips was sometimes accompanied by the raising of the front of the tongue, so a simultaneous occurrence of labialization and palatalization was heard, i.e. [ɥ]. The palatal glide, thus, occurred in four forms in this stage, i.e. [j] [ɥ] [j̃] [ɥ̃], for example,

palatal glide [j] $\begin{array}{|c|} \hline \epsilon \text{V}^{\text{j}} \text{a} \\ \hline - \text{ } \backslash \text{ } \backslash \\ \hline \end{array}$

palatal lateral glide [ɭ] $\begin{array}{|c|} \hline \text{ũ}^{\text{j}} \text{z} \epsilon \\ \hline \backslash \text{ } \backslash \\ \hline \end{array}$

nasalized palatal glide [j̃] $\begin{array}{|c|} \hline \tilde{\epsilon} : \tilde{\epsilon} \text{ũ}^{\text{j̃}} \tilde{\text{a}} \\ \hline - \text{ } \backslash \text{ } - \\ \hline \end{array}$

simultaneous labialization

and palatalization [ɥ] $\begin{array}{|c|} \hline \text{ɛ} \text{ } \text{ɛ}^{\text{ɥ}} \text{ũ}^{\text{ɥ}} \text{ } \text{ɛ} \\ \hline - \text{ } \backslash \text{ } - \\ \hline \end{array}$

At 0;3.20 the palatal and lateral glides appeared at the onset of syllables. Sometimes there was a simultaneous articulation of lip closure and lateral release resulting in [b̥], labial liquid, e.g.

Labial liquid | b̥ɛ: ɛ: | , | ap̥u b̥au̥ | , | b̥e ʔb̥e | ,
 - - - - - -
 | b̥ɛ:ə b̥ɛ:ə |
 / \

Palatalized lateral | al̥ɛ:ʃl̥e | , | ɛl̥ʃil̥ɛ: |
 - - - - - -

It also happened that the articulation of [l̥] was prolonged before being released; it thus appeared as both a link from one syllable to another and as an onset of the syllable which followed the link, e.g.

 | l̥ɛ: l̥: l̥ɛ: l̥: l̥ə |
 / - /

Palatal semivowel. As an onset, the palatal semivowel was more strongly articulated, e.g.

 | ɛə̆ ʃɛ: | , | a l̥ ʃɛ? ɛl̥ɛ: ʔɛ |
 - / - - \ -

A striking form of vocalization which was found consistently was the regular occurrence of combined elements as one unit , e.g. [ɛʏu̥]. What is called a combined form does not mean that the baby learns to combine the elements of his vocalizations, but it is possible to assume that this form fits in the baby's repertoire as a whole. In the examples at this stage, the first element of the combined form was a vocalization of open approximation ranging from half-close to open quality and accompanied by the frontness

feature. This was followed by a stricture of close approximation made at the velar or other places and then vocalization of open approximation followed which had the features of closeness and backness with either rounding or non-rounding, e.g. $[\epsilon\gamma^{\uparrow}u]$, $[a\gamma^{\uparrow}u]$, $[\text{apppu}^{\uparrow}]$.

Relationship between adult models and the baby's responses

The baby's responses to the adult models were mainly made during interaction in which 'dialogues' between the adult and the baby were conducted. As mentioned before, the data for this study were collected in a natural home situation. Sounds in the environment, in addition to speech sounds, seemed to play an important role in the baby's vocalizations. The baby paid attention to the sounds made around him, e.g. cuckoo-clock striking, to which the adult drew his attention and often repeated the sounds in onomatopoeic form; he also appeared to pay attention to adults talking to each other, and to the mention of his name.

In a comparison of the baby's babbling in exchanges with adults, it was found that there were certain shared features which it seems the baby was imitating from the adult models and some of which the adult was imitating from the baby, e.g. sounds in his repertoire, pitch, and prolongation of pitch.

The immediate echoing of the sounds in his repertoire which are addressed to him is illustrated in the sample below.

In the sample the mother is talking to a visitor; the baby has been vocalizing on his own for some time; then his mother turns to address him, using sounds from his repertoire. The baby echoes

what his mother produces:

Visitor

| ki: duən ləu ha |
| - - - - |

'How old is the baby?

Mother

| sa:m kha |
| ✓ \ |

'Three' ('months' understood)

Visitor

| mai khɔi rɔ:ŋ thau rai |
| \ \ \ - |

'Doesn't often cry, does he?'

Mother

| kha mai khɔi rɔ:ŋ |
| \ \ \ |

'No, he doesn't.'

Mother

| khui si luk khui pai |
| - - \ - - |

'Come on talk, baby.'

| ŋu: | ŋu ŋu: | aŋu: | ʔəkhaɪ |
| - | - | - - | / |

Baby

| hɛ | ŋu⁺ ŋu⁺ ŋu: | pause | ŋu: ŋu⁺g⁺ |
| - | - | \ | / \ |

pause | eɪ |
| \ |

| ŋu⁺ ŋu: | ε: ŋu⁺ŋu⁺ ε^{khə} | pause
| - | - - - - |

ŋu⁺ ŋu:	ŋu⁺ ŋu⁺ ŋu⁺ ŋu:

pause

| ŋu: ŋu⁺g⁺ | ŋu: | ŋu⁺g⁺ ŋu: | hɛ |
| - | - | - | / |

| ŋu⁺g⁺ ŋu: hu⁺ | ŋu: ε^{ʔkhə} | pause
| - / | - - |

What the mother was saying directly to the baby, in the last utterance of the above example, is not within the adult phonological

system (except the last two syllables, | ?ə khap |, which are a

question particle and a polite word), but she was using the sounds and structures, i.e. monosyllable [Yu] and combined form [əYu], of the baby's repertoire. The mother had heard the baby making these sounds while she was talking to the visitor; she then used them in addressing the baby. The result was that he responded to her sounds producing sounds very similar to hers.

In the next example, the grandmother and the baby are having a 'dialogue'. In the 'dialogue' the grandmother used falling pitch very often, and used both conventional expressions and sounds in the baby's repertoire. The baby produced responses to the most salient features he heard, and echoed them with sounds of his repertoire which had been addressed to him.

Grandmother

Baby

| arai ə luk | bɔ:k arai ə luk a |
| - ˩ - - | - - - ˩ - |

| ɛuː |
| ˩ |

'What, baby? What are (you)* telling
(grandma)*, baby?'

| lu:k bɔ:k arai khap lu:k pui |
| ˩ - - - ˩ ˩ |

| ?eYuː |
| - ˩ |

'What is Baby Pui telling (grandma)?'

* The omission of the subject or the object of a sentence in dialogue is common in the colloquial style of the Thai language.

Grandmother

Baby

ɔ: bək arai ə luk
| ˘ ˘ ˘ ˘ |

ʔu: ʔu:
| ˘ ˘ |

'Yes? What are (you) telling

(Grandma), Baby?

aʔu: ə lu:k
| ˘ ˘ ˘ ˘ |

ʔu: laughter
| ˘ |

'Is it aʔu: , Baby?'

The falling pitch in the adult's speech in the above example seemed to be the most salient feature for the baby as it is the one to which he responded most consistently.

The prolongation of pitch and vowel length was also seen in the baby's responses. It appeared as if the adult and the baby were playing vocally with each other, i.e. one adapted his speech (or vocalization) to match the other's. Such interaction could be seen from the imitation of pitch and pitch contour, the prolonging of pitch and vowel length, and the lowering of pitch register as if whispering to each other.

In the following example, the baby is in bed after waking up in the morning. His father addresses him in a low pitch register.

Father

Baby

tok tok tiəŋ na:
| ˘ ˘ ˘ ˘ |

ʔu:
| ˘ |

'(You) are falling off the bed.'

Father

| tok tiəy~~ na::: |
| - - - |

'Look out, (you) are falling off
the bed.'

ʔm:::

| ma: hom pha: ka phə na::: |
| - - - - - |

'Come, come under the blanket.'

Baby

| ũ: ẽ: ũ: | ũ: ũ: ʔ: a±? |
| - - - - - |

| ũ: ẽ ũ::: | h± | pause
| - - - - - |

| ũε::: |
| - - - - - |

In the above dialogue, the father spoke to the baby softly and sometimes indistinctly and, as a consequence, it was mostly the prolongation of pitch and creaky sounds that were heard. The baby responded by prolonging the pitch and vowel length in the similar way to that done by the adult.

Pre-phonological Description of Vocalizations in Stage I

Structure of single syllable vocalizations

Even though the baby's vocalizations were not functional nor very clear in this stage, there was some systematicity and consistency. Therefore a pre-phonological statement can be made.

Since the vocalizations in this stage are not functionally the same as in the adult phonological system, it is difficult to give the description in terms of Consonant and Vowel structure. Rather the pre-phonological structures will be set and discussed in relation to prosodic features.

The elements of the pre-phonological structures at this stage are V systems and prosodies. There is a two term V system, i.e. vocalizations within a close-grade system, e.g. [e] [ɛ] [ʊ] [u], and those within an open-grade system, e.g. [ɛ] [a] [ə] [ɔ]

The close-grade system is represented by [

The open-grade system is represented by]

The prosodies of the vocalizations abstracted at this stage are as follows:-

- y (exponent: frontness)
- ɥ (exponent: centrality)
- w (exponent: backness)
- r (exponent: rounding)
- ɹ (exponent: non-rounding)
- n (exponent: nasalization)
- ̃ (exponent: non-nasalization)

Other prosodies of the vocalizations which relate to the types of closure are assigned as follows:-

- ϕ (exponent: a stricture of open approximation)
- e (exponent: a stricture of close approximation)
- c (exponent: a stricture of complete closure)

If V represents monosyllabic vocalizations, the structure is always in the form of:

$$(\phi, e, c) V (\phi, e, c)$$

The possibilities with other prosodies listed above are

$$V = \begin{cases} - & , \quad \underline{yn/n} & , \quad \underline{wr/r} \underline{n/n} \\ \underline{yn/n} & , \quad \underline{yn/n} & , \quad \underline{wr/r} \underline{n/n} \end{cases}$$

For example,

$$\phi \underline{yr} \phi \quad \begin{bmatrix} \varepsilon \\ - \end{bmatrix}$$

$$c \underline{yr} n \phi \quad \begin{bmatrix} \tilde{a} \\ - \end{bmatrix}$$

$$\phi \underline{yr} c \quad \begin{bmatrix} \pm g \\ - \end{bmatrix}$$

$$c \underline{yr} c \quad \begin{bmatrix} \tilde{a}:k \\ - \end{bmatrix}$$

$e \text{ } \underset{\text{L}}{\text{w}} \text{r} \text{ } e$	$\left[\begin{array}{c} \gamma \ddot{u} : \gamma \\ - \end{array} \right]$
$e \text{ } \underset{\text{L}}{\text{y}} \text{r} \text{ } \phi$	$\left[\begin{array}{c} h \ddot{i} \\ - \end{array} \right]$
$\phi \text{ } \underset{\mathcal{L}}{\text{y}} \text{r} \text{ } e$	$\left[\begin{array}{c} \varepsilon : \text{ x} : : \\ - \end{array} \right]$

Structure of two syllable vocalizations^{*1}

Two syllables within a stretch of vocalization vary among the above-mentioned phonological structures. The possibilities of the variational structures of two syllable vocalizations are:

1. A two-way contrast within the structures of \mathcal{L} (open-grade), and L (close-grade), e.g. $\text{L} - \mathcal{L}$ and $\mathcal{L} - \text{L}$
2. No contrast: $\mathcal{L} - \mathcal{L}$ (open-grade only), or $\text{L} - \text{L}$ (close-grade only).

1.

1.1 Contrast of L (close-grade) and \mathcal{L} (open-grade)

The vocalizations start from the close-grade type and move to the open-grade type. Prosodies are similar to those of V discussed earlier. There might be a reduplication of either element of the two grade contrast. Reduplication will be discussed later.

Examples of this kind of contrast are given below:

$\phi \text{ } \underset{\text{L}}{\text{w}} \text{r} \text{ } \phi - c \text{ } \underset{\mathcal{L}}{\text{y}} \text{r} \text{ } \phi$	$\left[\begin{array}{c} \tilde{u} \text{ } \gamma \tilde{\varepsilon} : \\ - \quad - \end{array} \right]$
$e \text{ } \underset{\text{L}}{\text{w}} \text{r} \text{ } \phi - c \text{ } \underset{\mathcal{L}}{\text{y}} \text{r} \text{ } \phi$	$\left[\begin{array}{c} \widehat{\text{ppp}} \ddot{u} : \text{ } \eta \tilde{\varepsilon} : \\ - \quad \quad \quad \backslash \end{array} \right]$

^{*1} Syllables are divided on the basis of the changes of pitch, and of pitch discontinuity.

1.2 Contrast of \mathcal{L} (open-grade) and l (close-grade)

e.g.

$$\phi_{\mathcal{L}} \underline{y\ddot{r}n} \phi - \phi_l \text{ wr } \phi \quad \begin{bmatrix} \varepsilon^+ \ddot{u} \\ - - \end{bmatrix}$$

$$\phi_{\mathcal{L}} \underline{y\ddot{r}} \phi - e_l \text{ wr } c \quad \begin{bmatrix} a\ddot{y}u: \eta \\ - \backslash \end{bmatrix}$$

2. No contrast

2.1 \mathcal{L} - \mathcal{L} (open-grade)

There is no contrast of grade in this type. The only variation is the difference of prosodies. This type can be called a reduplicated structure, e.g.

$$e_{\mathcal{L}} \underline{y\ddot{r}} c - e_{\mathcal{L}} \underline{y\ddot{r}} c \quad \begin{bmatrix} h\varepsilon? \ h\varepsilon? \\ - - \end{bmatrix}$$

2.2 l - l (close-grade)

e.g.

$$\phi_l \underline{y\ddot{r}} \phi - \phi_l \text{ wr } \phi \quad \begin{bmatrix} \pm \ddot{u}: \\ - \backslash \end{bmatrix}$$

$$e_l \text{ wr } \phi - e_l \text{ wr } \phi \quad \begin{bmatrix} \ddot{y}u^+ \ \ddot{y}u^+ \\ - - \end{bmatrix}$$

Structure of three syllable vocalizations

The variational structures of three syllable vocalizations are as follows:

a) l - \mathcal{L} - l (close-open-close), e.g.

$$e_l \text{ wr } \phi - \phi_{\mathcal{L}} \underline{y\ddot{r}} \phi - e_l \text{ wr } \phi \quad \begin{bmatrix} \ddot{y}u^+ : \ \varepsilon : \ \ddot{y}u^+ \\ - - - \end{bmatrix}$$

b) \mathcal{L} - l - \mathcal{L} (open-close-open), e.g.

$$\phi_{\mathcal{L}} \underline{y\ddot{r}n} \phi - \phi_l \underline{y\ddot{r}} \phi - \phi_{\mathcal{L}} \underline{y\ddot{r}n} \phi \quad \begin{bmatrix} \tilde{\varepsilon} \ \pm \ \tilde{\varepsilon} : \\ - - - \end{bmatrix}$$

Structure of four syllable vocalizations, e.g.

c) $\mathcal{L} - \mathcal{L} - \mathcal{L} - \mathcal{L}$ (open-close-close-open), e.g.

$$\begin{array}{ccccccc} \phi & \text{yr} & \phi & e & \text{wr} & \phi & e \\ \mathcal{L} & - & \mathcal{L} & - & \mathcal{L} & - & \mathcal{L} \end{array} \quad \begin{array}{c} \text{yr} \phi \phi \text{yr} \phi \\ \mathcal{L} \end{array} \quad \begin{array}{c} \left[\begin{array}{ccc} \varepsilon: & \gamma^{\text{u}} & \gamma^{\text{h}} \\ - & \backslash & / \end{array} \right] \end{array}$$

At this pre-phonological level, it is possible to show a high degree of reduplication as far as the open and close grade system is concerned. The structures $\mathcal{L} - \mathcal{L}$ and $\mathcal{L} - \mathcal{L}$ are considered as fully reduplicated; the rest where the V grade differs (cf. 1.1, 1.2, a,b,c pp. 49-51) are partially reduplicated. Both types occur consistently in this stage.

Pitch

As mentioned earlier (p. 37) each vocalization has its own pitch and this was made the basis for defining the syllable for the vocalizations. In this stage, pitch is abstracted as a prosody of the syllable. Pitch prosodies are:

- L (exponent: low pitch)
- M (exponent: mid pitch)
- H (exponent: high pitch)
- R (exponent: rising pitch)
- F (exponent: falling pitch)
- R-F (exponent: rising-falling pitch)

In the same way as was the case in the V grade system, there are possibilities of pitch contrasts or an absence of contrast, e.g.

$$\begin{array}{c} \text{L-} \\ \text{V}_{\mathcal{L}} \end{array} \quad \begin{array}{c} \left[\begin{array}{c} \text{h}^{\text{h}} \\ - \end{array} \right] \\ \text{H-} \\ \text{V}_{\mathcal{L}} \end{array} \quad \begin{array}{c} \left[\begin{array}{c} \text{?a:k} \\ - \end{array} \right] \end{array}$$

$$\begin{array}{lcl}
 \begin{array}{c} \overline{M} - \overline{M} \\ \overline{V}_l - \overline{V}_\alpha \end{array} & & \begin{bmatrix} \overset{+}{u} & \varepsilon \\ - & - \end{bmatrix} \\
 \\
 \begin{array}{c} \overline{M} - \overline{F} \\ \overline{V}_\alpha - \overline{V}_l \end{array} & & \begin{bmatrix} a\overset{+}{y}u:9 \\ - & \backslash \end{bmatrix} \\
 \\
 \begin{array}{c} \overline{M} - \overline{H} - \overline{M} \\ \overline{V}_l - \overline{V}_\alpha - \overline{V}_l \end{array} & & \begin{bmatrix} \overset{+}{y}u: & \varepsilon: & \overset{+}{y}u \\ - & - & - \end{bmatrix} \\
 \\
 \begin{array}{c} \overline{M} - \overline{F} - \overline{R} - \overline{F} \\ \overline{V}_\alpha - \overline{V}_l - \overline{V}_l - \overline{V}_\alpha \end{array} & & \begin{bmatrix} \varepsilon: & \overset{+}{y}u & \overset{+}{y}u & \varepsilon^{kh} \\ - & \backslash & / & \wedge \end{bmatrix}
 \end{array}$$

Structure of sequences of stretches

The stretches, i.e. 1, 2, 3, or 4 syllable stretch, can occur in a random sequence. Therefore, no further description is required.

Conclusions

The early babbling is articulated vaguely and imprecisely, but it is possible to say that syllable units are produced mainly with 'non-checked' onset, i.e. strictures at onset are of open approximation or close approximation; the vocalic elements vary from openness to closeness or vice versa, and also vary from frontness to centrality and backness. However, there are no fully front and fully back qualities, i.e. the front sounds are not fully front and the back are advanced, so the vocalic elements tend to be centralized.

The features of the consonantal elements range from labiality, alveolarity, palatality, velarity to glottality, but these are

restricted, e.g.

w m β p b bbb ppp bl are instances of labiality
 n ɲ l of alveolarity
 ʒ j of palatality
 ʁ x k ɡ ŋ of velarity
 and ʔ h of glottality

The pitch of vocalizations varies among low, mid, high, falling, rising, and rising-falling. Nasalization occurs both when the baby was in the state of comfort and of discomfort.

In interaction, falling pitch, prolongation of pitch and vowel length appear to be responded to by the child. When he was addressed with sounds in his repertoire, he echoed them closely and instantaneously.

Stage II (0;3.23-0;4.19)

General Phonetic Description of Vocalizations in Stage II

In this stage, the vocalizations were still variable among those with strictures of open approximation, close approximation, and complete closure, but the strictures of open and close approximation predominated over the stricture of complete closure. In other words, 'non-checked'^{*1} vocalizations were produced more frequently than the 'checked'^{*2} vocalizations.

The vowel-like sounds^{*3} varied in a similar way to those described in Stage I, but there was progress in that open approximation with the half-open and half-close qualities, and backness and rounding features occurred, i.e. [ɔ̞] [o̞]. A number of diphthongs became more refined and more frequently produced, e.g. [aɪ] [aʊ] with long and short length.

In general, the number of syllables within a stretch was greater than before, but there were still some stretches which consisted of only one or two syllables. The vocalizations thus varied from long stretches to short stretches.

Nasalization and lip-rounding occurred randomly throughout this period. Pitch became more clearly produced, but the variation remained the same as that of the previous stage. Falling pitch mostly occurred together with loudness and long duration of vowel

*1, 2 See Glossary of Terms.

*3 The traditional form of the phonetic description of vowel-like sounds will henceforth be used, as it is more economical of space, although it is less suitable for describing babbling. Thus, 'back-rounded vowel' will be used for 'open approximation with backness and rounding features', etc.

or diphthongization. Later in this stage, screeching vocalizations were often produced with a combination of normal pitch register and high pitch register. The screeching vocalizations appeared regularly from this time on to the later stages.

Consonant-like sounds appeared to have increased. In addition to those in Stage I, complete closure at the alveolar place, i.e. [t] [d] occurred, but still with vague articulation. The voice and non-voice contrast of this pair was not always distinguishable. These sounds sometimes occurred with liquid, [l] [r] [ɾ] , release, e.g.

[t] with lateral liquid

ε:	ɔ̃±	t̃lε
-	\	-

[t] with a tap

ʔm	h:::	hɔ̃±	ɔ̃±	t̃f±aʔ
-	-	\	-	-

[d] with a tap

h̃u:	ʔu:	h̃u:	ε:ndrea
-	-	-	-

Homorganic articulation

It was in this stage that a homorganic disyllabic pattern began to appear. The syllable started with a checked onset, e.g. [m] [n] or [ŋ] , followed by another syllable with homorganic articulation, e.g. | m̃p̃ε | , | ŋ̃ŋ̃ε | , or started with an open vowel

followed by homorganic articulation of closure, and then released with an open vowel, e.g. | ε:ndrea | , | ant̃a: | .

Characteristics of sounds showing pleasure

In the state of comfort, the baby often seemed to find pleasure in producing sounds continuously and rhythmically. They are laughter-like sounds, e.g. [ɛ:] or [a:], and syllables with back consonants, i.e. velar, glottal, and uvular, e.g. [ɣ][k][g][ŋ][ʔ][R]. Very often crying-like sounds and nasalization were also produced in the state of comfort. Other features related to the happy state were the prolonging of sounds and pitch, and the occurrence of creaky sounds[~]. For example,

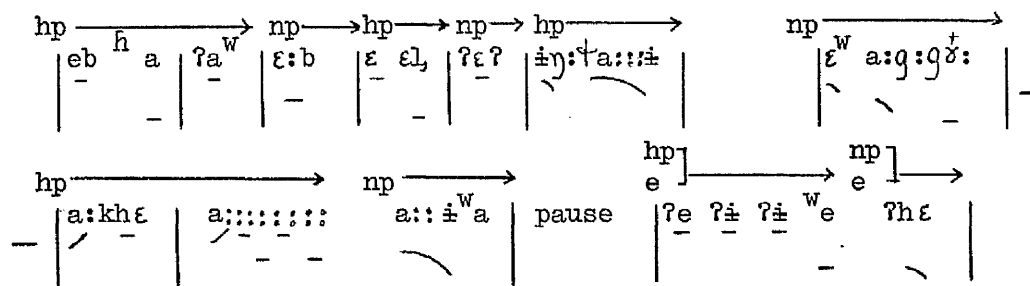
laughter | hm ɣ::ɛ | aŋtʔa: | ʔa:::~ | ,
 - - | - - | - - |

laughter | ɛŋə^kɣə | ɛŋə: | , | ʔū: ʔū ʔū:ək | ɛ: ʔa:k |
 - - - \ | \ - - | - - |

Vocal play

The vocalizations during concentrated play, e.g. 'investigating' or 'play with his toy', consisted of alternate short and long stretches which were either continuous or interrupted by pauses, or by a continuous burst of labial trills. Long stretches consisted of the production of vocalizations with quick rhythmic beats, and with repetitive syllable structures. Sometimes his vocal play appeared to show an emotive function; for example, when he was investigating a toy on his own, he made an interchange of vocal play and laughter-like sounds, or made sounds with prolonged rising pitch as if he was surprised. Such characteristics of the baby's vocal play were different from those of responses in adult-baby interaction. In adult-baby interaction, the vocalizations were short, and generally followed by pauses of silence, while the adult took his/her turn.

Nasalization occurred during the vocal play. Also, there was continuous occurrence of vocal play with various combinations of high pitch register, normal pitch register, and 'energy-exerting sounds'. The combinations of high pitch register, (hp), normal pitch register, (np), and energy-exerting sounds, (e), can be seen in the example below:



Relationship between adult models and the baby's responses

The baby's responses to the adult models progressed in several features. In addition to the response to the falling pitch in the adult's speech, other features such as labiality, lip-rounding, nasality, appeared in the baby's responses.

In the example of a 'dialogue' given below, the mother was making labial clicks^{*1} to draw the baby's attention. At first he did not respond, but watched what the mother was doing - the mother remarked that the baby was watching her mouth. Alternately with the clicks, the mother called the baby's name, [ɤpui], and sometimes added another syllable before the name^{*2}, i.e. [ɤpuk ɤpui];

*1 In the Thai culture, bilabial clicks and retroflex clicks are made to babies to draw their attention. Alveolar or denti-alveolar clicks are used as a warning sign.

*2 The process of syllable prefixation is common in Thai as 'intensifiers' or as 'phonaesthetics'. In the case of the baby's name, his mother used such a process for phonaesthetic purposes, i.e. [ɤpuk ɤpui] refers to 'fatness'.

every now and then she used the voiced labial, [b], for the voicesless unaspirated labial, [p], i.e. [buk /bui]. She produced the words with high pitch register intermingling with normal pitch register. The bilabial closure was, thus, presented to him repetitively.

As mentioned before, at first the baby did not respond to the clicks, but watched the point of articulation. Later when his mother made the clicks as well as calling his name, the baby made a response by using a sound already established in his repertoire, i.e. labial liquid, [bl], which shared the labiality feature, e.g.

Mother	Baby
<p>| pui wa: yai | mɛ: mai lu^{*1} ruəŋ | repeats</p> <p>| ✓ \ - | \ \ \ |</p>	<p>| ʔ̃: ʔ̃u: |</p> <p>| - - |</p>
<p>'What did Pui say? Mummy does not understand'.</p>	
<p>(labial clicks) + | buk bui | ɛ: buk bui |</p> <p>| - ✓ | - ✓ |</p>	<p>| a^w | bl̥ɛ bl̥ɛ bl̥ɛ bl̥ɛ |</p> <p>| - - \ - - |</p>
<p>'P's name'</p>	
<p>| buk bui hə luk |</p> <p>| ✓ / \ |</p>	
<p>'Is it 'buk bui' baby said?'</p>	

In addition to producing the labiality feature in response to the labial clicks, the baby also produced the rounding feature

*1 Conventionally [ru:], but as mentioned earlier, [l] and [r] are used interchangeably in colloquial Thai.

as a response to the clicks in other situations, e.g. he made

eū: ũ:	ēū ēū ũ: ũ ēū	| as a response to his father's labial clicks.
∪ -	- - - - -	

The baby's responses in this study so far, provide evidence for the baby's perception of some of the salient features of speech. Furthermore, it shows that at this stage he could respond to just one salient feature at a time. As his linguistic ability increased, other less salient features were also responded to and therefore were perceived.

From the example given before, one can see that although falling pitch was produced by the adult several times, and although falling pitch was auditorily salient in the adult's speech, the baby appeared to respond to labiality and rounding which were visually salient and to him apparently more salient. The lip-closure was easily observable and was produced repetitively by the adults. However, in later samples in this stage, around the end of this stage, other features including labiality and falling pitch were responded to.

For example, during the 'dialogue', the father was sweeping the floor; the baby was on his mother's lap. When he saw his father, he began to vocalize to draw his father's attention.

Father

Baby

liək ^{*1} phɔ: ə luk hm
∪ ∪ - ∪ ∪

j ε	ʔε
∪	\
hε: ʔū: ũ	∪ \ -

'Calling daddy, baby?'

*1 Conventionally [ʌriək].

Father

Baby

| phɔ: kwa:t ba:n^{*1} |
| ˩ ˩ ˩ |

| an̩ ma:n[˩] |
| ˩ ˩ |

'Daddy is sweeping the floor.'

In the 'dialogue' above, the baby initiated the dialogue by saying |^jɛ: ʔɛ |, which the father interpreted as [˩phɔ:],

'father', probably on the basis of the shared auditorily salient features (cf. Waterson, 1971), namely, falling pitch and the broad degree of openness of vowel - that is half-open vowel quality, and possibly the closed onset. He claimed that the baby was calling [˩phɔ:] 'father'. The baby responded using three different levels of pitch, but the falling one seemed to be the most distinct, i.e. accompanied by loudness. His father went on talking to him loudly with special emphasis on the last syllable of the utterance, i.e. [˩ba:n]. As a consequence, the baby responded loudly to the whole of the last syllable producing | an̩ ma:n[˩] |. Judging from the

baby's production, what the baby seemed to perceive from that syllable was labiality, nasality, pitch, loudness, vowel length and vowel quality, and syllable structure, i.e. CVC, e.g. [˩ba:n] compared

with [˩ma:n[˩]]. He may, of course, have perceived the oral onset but was not able to make a contrast of oral onset with nasal ending (cf. Waterson, 1976).

*1 [˩ba:n] literally means 'house', but it means 'floor' in this context.

Pre-phonological description of vocalizations in Stage II

The pre-phonological description of the baby's vocalizations in this stage, is generally the same as for Stage I. However, in Stage II, progress is shown in the occurrence of high pitch (hp), normal pitch (np), and energy-exerting sounds (e) in screeching vocalizations. Such vocalizations are produced in a three-term contrast. The possibilities of the contrast within a stretch are as follows:

1. Contrast of hp and np as in

hp	→	np	→
| a : : : : : |		| a : i w a |	
2. Contrast of (np+e) and np, e.g.

e	]	→	np	→
| ? a : i			| l e ? a	
3. Contrast of hp, np and e, e.g.

e	]	→	e]	→
hp			np		
| ? e ? ± ? ±			| w e ? h e		

Conclusions

There is progress in phonetic features in Stage II, and the vocalizations are less 'fluid' than those in Stage I. The back and rounded vowels [ɔ̃][õ], which did not appear in Stage I, began to be produced in Stage II.

For consonant-like sounds, the stricture of complete closure which had been made, in Stage I, at the labial, alveolar, velar, and

glottal places was still made at these same places, but at the alveolar place two more sounds were produced in Stage II, i.e. [t] and [d].

Syllable structures in the two stages were not different. The $\phi_V\phi$, e_V , and c_V structures occurred more frequently than the e_Ve , V^e , and V^c structures. It is noticeable that the latter were produced in vocalizations characterizing pleasure.

With regard to pitch, the pitch in both stages varied among low, mid, high, falling, rising, and rising-falling. However, in interaction, falling pitch appeared to be the most salient for the baby as it was often responded to. In Stage II, other salient features were also perceived and responded to. They are labiality, nasality, vowel-quality, and syllable structure.

Although the subject of the study is living in the environment of a tone language, and the pitch movements seem to show a great similarity to the lexical tones of the adult language, it is not possible to say that these variations of pitch show the characteristic features of a tone language, because when the child reached the one-word utterance stage, his functional use of pitch was more restricted at the lexical level than in the vocalizations during the early stages. Certain levels of pitch which occurred very frequently during early stages were rarely produced at the one-word utterance stage. For example, high falling pitch occurred very frequently before the one word stage, but high falling lexical tone was acquired late and therefore appears to be the most difficult for this child. Even at 18 months, the high falling lexical tone was not yet consistently produced.

Chapter 2

Later BabblingStage III (0;4.20-0;5.15)General Phonetic Description of Vocalizations in Stage III

The baby's vocalizations developed from mainly 'non-checked' to 'checked' vocalizations. That is to say the increase of vocalizations with complete closure at the labial and non-labial places was tremendous. The syllable patterns of the 'checked' vocalizations varied between monosyllabic and disyllabic, e.g. [pa], [appa], and [apa], but the disyllabic patterns outnumbered the monosyllabic. Such vocalizations were repetitive in nearly every stretch and were produced with quick rhythm. Sounds within the stretches appeared to be more forcefully articulated. Loudness occurred mainly in relation to accentuation and falling pitch. In disyllabic patterns, accentuation appeared to fall on the second syllable.

Although the 'checked' vocalizations occurred increasingly in this stage, the 'non-checked' vocalizations like those in Stages I and II were still in use. The 'checked' vocalizations of this stage and the 'non-checked' vocalizations in general had certain distinct features concerning pitch, nasalization, and vowel quality, as described below:

Pitch

In the disyllabic patterns of the 'checked' vocalizations, pitch changed from the wide range previously used and used in the

'non-checked' vocalizations, to a restricted group of pitch levels, e.g. high-mid, mid-mid, falling-mid, and mid-falling. Occasionally, a low-mid pair was produced but was not very different from the mid-mid pair. An example of the 'checked' vocalizations with the restricted pitch patterns is given in Appendix 2.4.

Nasalization

Nasalization, which had appeared randomly with both 'checked' and 'non-checked' vocalizations in the previous stages, was now produced mainly with the 'non-checked' vocalizations and disappeared when the 'checked' vocalizations were produced. However, nasalization did occur with vocalizations having glottal constriction or having nasal onset, e.g. [ʔẽ], [ɲɛ].

Vowel quality

It was noticeable that when the 'checked' vocalizations were produced in this stage, only frontness and centrality features were present, and the degree of openness ranged from close, half-close, half-open, and open, but when the 'non-checked' vocalizations were produced, backness, frontness, centrality, openness, closeness, as well as rounding and non-rounding features occurred. There was thus a greater restriction of features co-occurring with 'checked' vocalizations.

As described earlier, there was a flow of babbling with strictures of complete closure; these continuous repetitive vocalizations were produced with open syllables which appeared in three forms: one starting with stricture of complete closure followed by front or central vowel, e.g. [pa:], [dʒi]; another form starting

with front or central vowel followed by stricture of complete closure and released with front or central vowel, e.g. [apa], [apɪ]; the other form starting with front or central vowel followed by stricture of complete closure of relatively long length, and released with front or central vowel, e.g. [appa], [appɪ]. Examples of this type of vocalization are illustrated in Appendix 2.5.

The homorganic oral-oral and nasal-oral articulations which became established in the baby's repertoire in the earlier stage, e.g. [aɪlɪ], [andrea], [ɛbɛɛ], developed increasingly in this stage. This shows that the baby was capable of making firm closure, holding the closure before the release, and vocalizing within a similar or same level of pitch for each vocalization.

It is plausible to assume tentatively that the strongly articulated strictures of complete closure in this stage are the starting point of the acquisition of plosives and affricates in general. The plosives and affricates which were used in this stage (Stage III), continued to be used later on and in the one-word utterance stage, and eventually developed to be some of the functional units of Thai, viz. [p][b][t][d][tɕ].

Vocal play

It is evident that once the baby began to produce new sounds, they appeared more frequently in his vocal play in almost all situations, e.g. playing on his own, when crying or being unhappy, and before going to bed (similar to Weir's report on her child's pre-sleep monologues (Weir 1962)). In this stage, he often practised the 'checked' vocalizations in the above-mentioned situations, and sometimes the 'checked' vocalizations intermingled with the 'non-checked'.

Later in this stage (0;5.05), back vowels appeared in his vocal play, and were often found in combination with the high pitch register, normal pitch register, and 'energy-exerting sounds'.

Relationship between adult models and the baby's responses

In Stage III when plosives and affricates appeared to be consistently produced, the adults seemed to adapt their imitative speech to the baby by producing utterances with plosive and affricate onsets to which the baby responded similarly. The adults also related what they produced to meaningful expressions in the conventional system, e.g. [tʃa:] and [ʌtʃa] ^{*1}, politeness particles.

In the following example, the baby was with his grandmother; he was vocalizing while investigating his toy bottle. His grandmother repeated what she felt resembled the particles.

Grandmother

Baby

		hadʒə had	
tʃa: tʃa	tʃa: tʃa		
		drɛ: drɛ	drɛ ɛ drɛ
		hp	→
		a::: ũ	a::: ũ
		wa:	appppɛ
		hap	pppa

*1 This word was sometimes produced with long length in addressing the baby. This matter is discussed in language addressed to the baby, pp. 205-218.

Grandmother

Baby

| ɔ: atɕa | tɕa: tɕa: lɛu ə luk |

'Yes, atɕa. Did baby say 'tɕa:/tɕa: '?'

| tɕa? tɕa: ə luk | tɕa? tɕa: |

'Is it tɕa /tɕa:, baby?'

| tɕa: tɕa: |

| hɛ::: | ʔa:d: dʒə | ad: dʒa: e:i |

laughter

laughter

| luk pui pui khui keŋ |

laughter

'Baby Pui Pui is chatty'

| a:d dʒa |

| a: a::əɖ: dʒa |

The baby's responses to the adult models in the above example appeared to share several features of the whole syllable, e.g. checked onset, alveolarity/palatality, affrication, and openness and frontness. The example given above also provides further evidence of the baby echoing the sounds of his repertoire that were addressed to him. For example in the last utterance, the adult produced

| a:d dʒa | which was echosed by him as | a: a::əɖ: dʒa |.

As far as the pitch feature is concerned, the adult model and the baby's response were very similar, i.e. mid pitch for [-dʒa] and higher pitch for the preceding syllable. It is noticeable that rising pitch was produced by the baby a couple of times in this

example, but it did not correspond consistently with the models. Thus, it is not certain as yet whether the baby perceived the rising pitch, i.e. change from lower to higher. He possibly recognized the high pitch quality which was similar to his high pitch register which had been practised in his screeching vocalizations, but when other more salient and more familiar features were produced, he appeared to pay more attention to them.

Pre-phonological description of vocalizations in Stage III

The basic syllable structures of the vocalizations in Stage III are still the same as in Stages I and II, i.e. $\phi, e, c\phi, e, c$. However as indicated in the phonetic description, the vocalizations in Stage III were forcefully articulated, and appeared to be of two types, i.e. 'checked' and 'non-checked'. Thus, the syllable structures are now treated as Consonantal, Vocalic, and Schwa elements, i.e. C, V, \emptyset , instead of prosodically as previously.

Syllable structures, therefore, are of two types: monosyllables, V, CV, and disyllables, $\emptyset CV$ and $\emptyset \hat{C} CV$.

The V and CV syllables may be accented or unaccented; the $\emptyset CV$ and $\emptyset \hat{C} CV$ disyllables appear with a restriction that the first syllable, i.e. \emptyset , is not accented except when it occurs with the falling pitch prosody, but the second syllable is always accented. Syllable finals are still treated prosodically because the possibility of contrasts with stricture is still very small.

Pre-phonological structure of monosyllables

Prosodies of the monosyllables, apart from the pitch prosody and syllable final prosody, are similar to those in Stages I and II, i.e. y (exponent: frontness), \underline{y} (exponent: centrality), w (exponent: backness), r (exponent: rounding), \underline{r} (exponent: non-rounding), n (exponent: nasalization), \underline{n} (exponent: non-nasalization).

The pitch and syllable final prosodies which are not the same as those in Stages I and II are described below.

Pitch prosodies of the monosyllable. There is a contrast of five pitch prosodies with monosyllabic structures, i.e.

L	(exponent: low pitch), e.g.	$\begin{smallmatrix} L- \\ CV \end{smallmatrix}$
M	(exponent: mid pitch), e.g.	$\begin{smallmatrix} M- \\ CV \end{smallmatrix}$
H	(exponent: high pitch), e.g.	$\begin{smallmatrix} H- \\ CV \end{smallmatrix}$
F	(exponent: falling pitch), e.g.	$\begin{smallmatrix} F- \\ CV \end{smallmatrix}$
R	(exponent: rising pitch), e.g.	$\begin{smallmatrix} R- \\ CV \end{smallmatrix}$

Syllable final prosodies. There is a contrast of three prosodies, i.e.

cw	(exponent: complete stricture at velar place)
c \underline{w}	(exponent: complete stricture at glottal place)
-ew	(exponent: stricture of close approximation at velar place).

For example:

CV^{cw}	$[\text{?a:}^k]$, $[\text{?a:}^g]$, $[\text{?e}^g]$
$CV^{c\bar{w}}$	$[\text{?a?}]$
V^{cw}	$[\text{e?}]$
CV^{ew}	$[\text{?a:}^y]$

V monosyllable. The two-term V system, l, ɔ, of the V monosyllable is similar to those in Stages I and II; both terms function with the above-mentioned prosodies.

CV monosyllable. The V system of the CV monosyllable is similar to that of the V monosyllable, and will not be discussed again here.

C systems. The C systems are restricted to P (Plosive), N (Nasal), F (Fricative), and ʋ (Continuant) subsystems.

P subsystem. There is a five-term contrast: p (labial), t (alveolar), c (palatal), k (velar), ʔ (glottal). These are illustrated below:

P _p V	e.g. [pa], [ba]
P _t V	e.g. [ta] [da]
P _c V	e.g. [dʒɛ] [dʒa]
P _k V	e.g. [gɛ]
P _ʔ V	e.g. [ʔe], [ʔɛ], [ʔa]

N subsystem. There is a four term contrast: p (labial), t (alveolar), c (palatal), and k (velar), e.g.

N _p V	e.g. [ma], [mɛ]
N _t V	e.g. [na], [nɛ]
N _c V	e.g. [ɲɛ], [ɲɔ]
N _k V	e.g. [ŋɛ], [ŋɔ]

F subsystem. There is a three term contrast: p (labial), k (velar), and ʔ (glottal), e.g.

F _p V	e.g. [pɛ], [pɛ̃]
F _k V	e.g. [kɛ], [kɛ̃], [kɛ̃]
F _ʔ V	e.g. [hɛ], [hɛ̃], [hɛ̃]

ʋ subsystem. There is a two term contrast: p (labial), and c (palatal), e.g.

$\nabla_p V$ e.g. [wɛ], [wɪ]
 $\nabla_c V$ e.g. [je], [jɛ]

The contrasts of the subsystems of C can be compared in the following table

Table 1. Comparison of the contrasts at C

P subsystem	p	t	c	(k) ^{*1} ?
N subsystem	p	(t)	c	(k)
F subsystem	p			k ?
∇ subsystem	p		c	

Thus, at the level of phonetic exponence, the P and N subsystems correspond to 'checked' vocalizations, and F and ∇ to 'non-checked'.

The restrictions of the subsystems at C in relation to the prosodic contrasts of the syllable within which ɫ and ɮ function are discussed below.

Subsystems of C and V in relation to prosodies of the monosyllable CV

P and N subsystems. The p (labial), t (alveolar), and c (palatal) contrasts function with both ɫ grade and ɮ grade, but with only three prosodies:

*1 Bracketed symbols in the table above show that such contrasts occur less frequently than the others in the same subsystem.

y	(exponent: frontness)
ɹ	(exponent: centrality)
ɹ̄	(exponent: non-rounding)

For example

$P_p \propto y\bar{r}$	[pa], [pɛ]	;	$N_p \propto y\bar{r}$	[ma], [mɛ]
$P_t \propto y\bar{r}$	[tə], [tɛ]	;	$N_t \propto y\bar{r}$	[nə]
$P_o \propto y\bar{r}$	[dʒə]	;	$N_o \propto y\bar{r}$	[ʃɛ]
$P_c \propto y\bar{r}$	[dʒɹ̄]	;	$N_c \propto y\bar{r}$	[ʃə]
$P_c \propto y\bar{r}$	[dʒa], [dʒɛ]	;		

P_k and N_k and P_r . These contrasts, on the other hand, function with any combination of the prosodies of the syllable.

For example (only selected examples are given here):

$P_k \propto y\bar{r}$	[gɛ], [ga]	$N_k \propto y\bar{r}$	[ŋɛ]
$P_k \propto w\bar{r}$	[gʉ]	$N_k \propto y\bar{r}$	[ŋɹ̄]
$P_r \propto y\bar{r}$	[ʔa], [ʔɛ]		
$P_r \propto w\bar{r}$	[ʔʉ]		
$P_r \propto w\bar{r}$	[ʔʉ]		

F and ɸ subsystems. These subsystems function with any combination of syllable prosodies, e.g.

$F_p \propto y\bar{r}$	[βɛ]	;	$ɸ_p \propto y\bar{r}n$	[wɛ̃]
$F_p \propto y\bar{r}$	[βɹ̄]	;	$ɸ_p \propto w\bar{r}$	[wʉ]
$F_k \propto y\bar{r}$	[ɸ̄]	;	$ɸ_c \propto y\bar{r}n$	[jɛ̃:]
$F_k \propto y\bar{r}n$	[ɸ̄̃]			

$F_k l^{wr}$	$[y^u]$
$F_7 l^{(y\bar{r}-wr)}$	$[heu]$
$F_7 l^{ym}$	$[h\tilde{e}]$
$F_7 l^{y\bar{r}}$	$[h\epsilon]$

As mentioned earlier, the syllable structures in this stage are of two types: monosyllables and disyllables. The pre-phonological description of the disyllables is given below:

Pre-phonological structure of disyllables: $\emptyset CV, \emptyset \hat{C}CV$

The syllable prosodies, apart from pitch prosodies, are similar to those of the monosyllable. The restrictions of the P and N subsystems in relation to the prosodic contrasts of the monosyllable CV also apply to the possibilities of prosodic contrasts with P and N of the disyllables.

The syllable final prosodies which function in the monosyllables V and CV do not function in the disyllables.

Pitch prosodies Pitch prosodies of disyllabic structures $\emptyset CV$ and $\emptyset \hat{C}CV$ are of four types:

1. H-M (exponent: high pitch on the first syllable and mid pitch on the second)
2. F-M (exponent: falling pitch on the first syllable and mid pitch on the second)
3. M-F (exponent: mid pitch on the first syllable and falling pitch on the second)
4. M-M (exponent: mid pitch on both syllables).

A four term prosodic contrast functions with the $\emptyset \hat{C}CV$ structure, but only a three term prosodic contrast, i.e. M-M, H-M,

F-M functions with the $\mathcal{O}CV$ structure, e.g.

$\mathcal{O}CCV$

H-M-

$\mathcal{O}CCV$ e.g. $\left| \begin{smallmatrix} \text{appa} \\ - \end{smallmatrix} \right| , \left| \begin{smallmatrix} \text{atta} \\ - \end{smallmatrix} \right| , \left| \begin{smallmatrix} \text{adda} \\ - \end{smallmatrix} \right|$

F-M-

$\mathcal{O}CCV$ e.g. $\left| \begin{smallmatrix} \text{ad: d, } \epsilon \\ \curvearrowright - \end{smallmatrix} \right|$

M-F-

$\mathcal{O}CCV$ e.g. $\left| \begin{smallmatrix} \text{ad: d, } \epsilon: \\ - \curvearrowright \end{smallmatrix} \right| , \left| \begin{smallmatrix} \text{emp: } \\ - \curvearrowright \end{smallmatrix} \right| , \left| \begin{smallmatrix} \text{ed, d, } \epsilon: \\ - \curvearrowright \end{smallmatrix} \right|$

M-M-

$\mathcal{O}CCV$ e.g. $\left| \begin{smallmatrix} \text{appa} \\ - - \end{smallmatrix} \right| , \left| \begin{smallmatrix} \text{a: d, d, } \epsilon \\ - - \end{smallmatrix} \right|$

$\mathcal{O}CV$

F-M-

$\mathcal{O}CV$ e.g. $\left| \begin{smallmatrix} \text{a: }^i \text{d, } \epsilon \text{a} \\ \curvearrowright - \end{smallmatrix} \right|$

H-M-

$\mathcal{O}CV$ e.g. $\left| \begin{smallmatrix} \text{ata:} \\ - - \end{smallmatrix} \right| , \left| \begin{smallmatrix} \text{apa:} \\ - - \end{smallmatrix} \right|$

M-M-

$\mathcal{O}CV$ e.g. $\left| \begin{smallmatrix} \text{apa} \\ - - \end{smallmatrix} \right| , \left| \begin{smallmatrix} \text{ada} \\ - - \end{smallmatrix} \right| , \left| \begin{smallmatrix} \text{at: } \epsilon \\ - - \end{smallmatrix} \right|$

V system of disyllabic structures. There is a contrast of close grade, I , open grade, A , which function with the syllable prosodies mentioned before (cf. pp. 72-73). For example,

$\mathcal{O}CC\text{I}\text{A}^{\text{yr}}$ e.g. $[\text{appa}] , [\text{ed, d, } \epsilon]$

$\mathcal{O}CC\text{A}\text{A}^{\text{yr}}$ e.g. $[\text{a: d, d, } \epsilon]$

$\mathcal{O}CC\text{I}\text{I}^{\text{yr}}$ e.g. $[\text{ad, d, } \epsilon]$

\mathcal{O} system. This functions in the unaccented syllable of disyllabic structures with a three term prosodic contrast:

y (exponent: frontness)

y (exponent: centrality)

r (exponent: non-rounding)

For example

$\mathcal{O}CV$ structure		$\mathcal{O}\widehat{CCV}$ structure	
$\mathcal{V}\mathcal{F}\mathcal{O}CV$	[adʒa]	$\mathcal{V}\mathcal{F}\mathcal{O}CCV$	[ɪppa]
$\mathcal{V}\mathcal{F}\mathcal{O}CV$	[ɪdʒa]	$\mathcal{V}\mathcal{F}\mathcal{O}CCV$	[ɛppa]
$\mathcal{V}\mathcal{F}\mathcal{O}CV$	[aɟɛ]	$\mathcal{V}\mathcal{F}\mathcal{O}CCV$	[appa]
$\mathcal{V}\mathcal{F}\mathcal{O}CV$	[aɣ̣ụ]	$\mathcal{V}\mathcal{F}\mathcal{O}CCV$	[aŋṭla:]

C systems. The C systems of the different structures are given below:

$\mathcal{O}CV$ structure. The C system of the $\mathcal{O}CV$ structure is restricted to P (Plosive) and F (Fricative).

P subsystem. There is a four term contrast: p (labial), t (alveolar), c (palatal), and k (velar), e.g.

$\mathcal{O}P_pV$	[apa], [ɛpa]
$\mathcal{O}P_tV$	[aṭa], [aɟ̣a], [ɛṭa], [aɟ̣a]
$\mathcal{O}P_cV$	[adʒa], [ɪdʒa], [adʒɛ]
$\mathcal{O}P_kV$	[aɟɛ]

F subsystem. There is only one term for the F subsystem, i.e. k (velar), e.g.

$\mathcal{O}F_kV$	[aɣ̣a], [aɣ̣ɛ], [aɣ̣ụ], [aɣ̣ụ]
-------------------	----------------------------------

$\mathcal{O}\widehat{CCV}$ structure. The C system of the $\mathcal{O}\widehat{CCV}$ structure is restricted to N and P in the sequence N, P, or P, P represented as \widehat{NP} , \widehat{PP} . \widehat{NP} has a two term contrast, i.e. p (labial) and t (alveolar); but \widehat{PP} has a three term contrast, i.e. p (labial), t (alveolar), and c (palatal). Examples are given below:

$\mathcal{O}\widehat{NP}_pV$	[ɛmpɛ:]
$\mathcal{O}\widehat{NP}_tV$	[aŋṭa:] [aŋḍɛa], [aŋṭla:]

$\supset \hat{P}P_c V$	$[addz\epsilon], [addz\pm]$
$\supset \hat{P}P_p V$	$[appa], [\pm ppa], [app\epsilon]$
$\supset \hat{P}P_t V$	$[at\tau a], [adda]$.

Conclusions

Within the first few months of life, the increase in complexity in the range of vocalizations is very considerable. In Stage III, the vocalizations are of two types: 'checked' and 'non-checked'. The 'non-checked' vocalizations occurred with vowels of the back, central, and front qualities. Unlike the 'non-checked' vocalizations, the 'checked' vocalizations were restricted to vowels of front and central qualities only.

Another feature which is more advanced than that of the vocalizations in Stage II is the occurrence of fixed patterns of pitch. These occur with the disyllabic patterns whereas the pitch levels of the monosyllabic patterns are still variable among low, mid, high, rising, and falling pitch contours.

The relationship between the adult models and the baby's responses has also become closer. In Stage II, labiality, nasality, syllable structure, vowel quality, and pitch of the adult models were responded to by the baby in his productions. In Stage III, labiality, alveolarity/palatality, affrication, syllable structure, vowel quality, pitch and pitch patterns were produced in response to and matching the models.

Stage IV (0;5.16-0;7.20)

General Phonetic Description of Vocalizations in Stage IV

For a short period from the beginning of this stage, (0;5.16-0;5.17), the baby's vocalizations were continuous but less clear and several were untranscribable. Frequently his vocalizations were interspersed with liquids, [l] [r]. In other respects the vocalizations were the same as Stage III, i.e. consisting of checked and non-checked vocalizations.

From 0;5.18 to 0;5.22, there were no recordings available because of mechanical problems. Recording was resumed at 0;5.23. It was found during the period 0;5.23-0;6.13 that the baby's general vocalizations had not changed. The same fixed patterns of pitch were still in use. There was no progress in the articulation of consonants and vowels in this stage, but progress was shown in the use of vocalization functionally, i.e. certain disyllabic stretches began to be used with certain implications.

Beginning of functional use of sounds and pitch

The baby's desire for communication had increased. In interaction with the adult, both participants appeared to communicate with each other in a well-conducted way. In the sample below, for instance, the baby was playing the peek-a-boo game with the adults. The adults used 'baby talk', [ˈtʃa ðe] and [ˈtʌk -kɜː] as expressions for the 'boo'; the baby used certain utterances consistently in response to the 'boo'. For example,

Father

| xi xi | tɕa ʔe |
| / / | / |

'Peek-a-boo'

repeated

repeated

Baby

| ʔɛ: ʔhɛ: | (laughs)
| - - |

| ʔɛ: ɛ: |
| - \ |

| ʔɛ: ɛ |
| - \ |

Mother (encouraging the baby)

| key lu:k key | i:k i:k lu:k |
| - \ - | - - \ |

'Good, baby, good. Again, again, baby.'

Father

uses same expression
same action

"

"

"

"

| ʔɛ: ɛ: |
| - - |

| ʔɛ: ʔɛ: | | ʔɛ: ɛ: |
| - \ | | - - |

| hʔɛ: ɛ: |
| - - |

| ʔɛ: ɛ: |
| - - |

| ɛ: | (laughs)
| - |

The baby's responses in the situation above carried an affective implication of pleasure, and it is probable that the baby's utterance used in response to the adult's 'boo's' and action has a meaning implication of some kind. The functional use of

Nasalization which occurs in this example supports the statement made in Stage I that this baby used nasalized vocalizations in both the happy state and the unhappy state.

From 0;6.13-0;7.00, no data were available as the tapes had been damaged. In the later period of Stage IV, i.e. from 0;7.01-0;7.20, the vocalizations varied between 'checked' and 'non-checked', but in this period checked monosyllables were produced more than checked disyllables.

Vocal play

In vocal play, vocalizations were frequently interrupted by labial trills, e.g. [bbb, ppp], labial liquids, e.g. [bl̥, pl̥], and also by friction made at various places, e.g. [β::], [ð::], and [ʒ::]. In addition, in this period the baby started producing 'singing tune' vocalizations in his vocal play. In other words, the baby now began to play with pitch.

The 'singing tune' had its own characteristics; these were: loudness, continuity, prolongation of vowel length and pitch, combination of high pitch register and normal pitch register, combination of glottal constriction and non-glottal constriction, and lowering or falling of pitch contour at the end of most stretches.

The 'singing tune' vocal play appeared mainly with 'non-checked' vocalizations, i.e. vowels alone, or vowels with fricative or semivowel onset. More often the singing tune was produced continuously with very high pitch, starting with high or rising to high pitch, holding the high pitch for a relatively long time until the breath was released. These resulted in accentuation of the last part of the breath group with lower pitch level. The combination

of high pitch register and normal pitch register in the 'singing tune' suggests a possibility that these strategies of lowering the pitch level and of the alternation between high pitch and normal pitch registers are ways of controlling the breath during phonation. Lieberman, in his study of breath group and intonational signals in infant cries, states that 'the subglottal air-pressure must fall at a rapid rate as expiration ceases, because the subglottal air-pressure assumes a negative value during inspiration. If phonation is protracted until the last possible moment, the breathgroup will therefore terminate with a falling fundamental frequency contour.' (Lieberman, 1967: 43-44).

Examples of the 'singing tune' are given in Appendix 2.6.

It is also possible that the 'singing tune' vocalizations, especially those with alternation of high pitch and normal pitch registers helped in the learning of pitch contrast which was used functionally in this stage and the next stages.

Relationship between the adult models and the baby's responses

The baby's responses matched the models in cases where the models were imitations of the baby's vocalizations and where the models had no complexity in terms of articulatory differentiation. The responses to syllables with [p] [t], and [tɕ] onsets were the ones that were most correctly produced, but the baby often produced them with the lenis variants, i.e. [b] [d] [dʑ].

In the later period of this stage, the child attempted to match the number of syllables of the adult utterance and strictures of complete closure, e.g.

Mother

| nai kɛ: a lusk |
| / - - \ |

'Where is [-kɛ:], baby?'

| kɛ: kɛ: | kɛ: kɛ: |
| - - | - - |

(delightedly) | kɛ: |
| - |

repeats

kɛ:

| a.kɛ kɛ:: |
| - - - |

| a.kɛ kɛ:: |
| - - - |

| kɛ: kɛ: |
| - - |

| kɛ: kɛ: |
| - - |

(repeats several times)

Baby

x: kɛ:::

gɛ:::

no response

| ʔɛ: ʔɛ: | ppp ::::: pɔ:ɛ: |
| - - | - - |

ɛ::

| aʔ[±] ʔ::: |
| - - |

| a^dʔ::: ʔʔɛ: |
| - - - |

| a^dʔ::: ʔ::: | ɛ: ɛ: |
| - - - | - - |

no more responses

In the baby's first two utterances, the responses were very close to the model, i.e. [-kɛ:]^{*1}. The baby responded accurately

*1 [-kɛ:] is a reduced form for [-tuk -kɛ:] 'big lizard', which is used onomatopoeically for the peek-a-boo game, or to draw the baby's attention.

to velar plosion, degree of openness of vowel, i.e. half-open, frontness, vowel length, and pitch. However, he produced his utterances with loudness and longer length, so as a consequence, there was a slight drop in pitch level at the end of the phonation.

Up to this stage, the basic system of consonants established in the baby's repertoire was a contrast of 'labial' and 'non-labial'. The non-labial consonants were articulated at the alveolar, palatal and glottal places. Articulation at velar place appeared to involve a great effort and was seldom produced. The baby's responses in the example given above, then, shifted to the use of the non-labial sounds of his basic system, i.e. alveolar-palatal. His response to velar plosion in the models by using alveolar-palatal articulations can be seen in the last three utterances of the above example.

The baby's phonetic system

The baby's repertoire by the age of 0;7.20 can be tentatively grouped into basic and peripheral systems. The basic system is defined as a system of sounds, pitch, and syllable patterns which have already become established and occurred more frequently in his vocalizations, and those which the baby was capable of producing in response to adult models and which were subsequently found to continue to appear in the later stages and in the one word utterance stage.

The peripheral system is defined as a system of sounds, pitch, and syllable patterns which occurred less frequently, or occurred only in conjunction with other phonetic features and situations,

e.g. falling pitch was used in connection with loudness and long length of vowel; [k^hə] was produced as a rhythmic beat when jumping or to show pleasure; a series of fricatives and rolls was produced in vocal play.*1

The basic and peripheral systems are as follows:

I Syllable patterns

Basic syllable patterns are: V, CV, əCV and əČCV structures.

Peripheral syllable patterns are: V^{c,e} and CV^{c,e} structures.

II Pitch system

Basic pitch system of monosyllables: V, CV are mid and/or low

Basic pitch system of disyllables: əCV, əČCV are high-mid, falling-mid, mid-falling, and mid-mid.

Peripheral pitch system consists of high, falling, and rising.

III Vowel system

Basic vowel system consists of: Front: e ɛ a

Central: ɨ ə

Peripheral vowel system consists of:

Front: œ y

Back: ʊ ũ ɔ̃ ɔ̃ ɔ̃

Diphthongization: aɨ au eɨ ɛɨ aœ ɛə

IV Consonantal system

Basic consonantal system consists of the following:

Labial: p b m w

Alveolar: t d n

Palatal: tʃ dʒ

Glottal: ʔ

*1 Both the basic and peripheral systems are produced in the vocal play.

Peripheral consonantal system consists of the following:

Labial: \widehat{ppp} \widehat{bbb} β \widehat{bl} \widehat{ml}
 Alveolar: l r r
 Palatal: j ɟ ɟ
 Velar: k^h k g γ γ x
 Glottal: h

Most of the sounds, pitch and syllable patterns in the basic system were found to grow closer and closer to the adult system. Those which do not function in the adult system were found to drop out eventually. Some of those in the peripheral system in time became incorporated into the basic system which eventually developed into the system of the Thai language. Other sounds in the peripheral system which do not occur in the language of the environment dropped out of the system.

Pre-phonological Description of Vocalizations in Stage IV

As a basic phonetic system was set up in the phonetic description, a corresponding basic pre-phonological system is described.

Pre-phonological description of the basic system of vocalizations

In the basic pre-phonological system, the elements of syllable structure are C, V and \emptyset ; the structures are of two types, monosyllables and disyllables. The monosyllabic structures are V and CV. The disyllabic structures are $\emptyset CV$ and $\emptyset \widehat{CCV}$. This is the same as in the pre-phonological system at Stage III.

Monosyllabic structures

Prosodies. Prosodies of the monosyllables including pitch prosodies are listed below:

- y (exponent: frontness)
- y (exponent: centrality)
- r (exponent: non-rounding)

Pitch prosodies in the basic system function in a two term contrast, M and L

- M (exponent: mid pitch)
- L (exponent: low pitch)

V system. There is a contrast of two grades: l (close) and ʌ (open) in the V system of monosyllables. They function in the syllable with the above-mentioned prosodies.

C systems. The C systems of the monosyllable CV are restricted to P (Plosive), N (Nasal) and ʋ (Continuant).

P subsystem. There is a four term contrast: p (labial), t (alveolar), c (palatal), and ʔ (glottal).

N subsystem. There is a two term contrast: p (labial) and t (alveolar).

ʋ subsystem. There is only one term: p (labial).

The contrasts of the subsystems of C in the basic system of monosyllables can be compared in Table 1.

Table 1. Contrasts at C in the basic system

P subsystem	p	t	c	ʔ
N subsystem	p	t		
ʋ subsystem	p			

Selected examples of monosyllabic structure with full formulae are given below: (pitch prosodies are shown above the phonetic symbols).

$P_p \propto \overline{y\overline{x}}$	:	M— [pa]	L— [pa]	M— [pɛ:]
$P_t \propto \overline{y\overline{x}}$	:	M— [tə]	M— [tɛ]	
$P_c \propto \overline{y\overline{x}}$	:	M— [dʒə]	M— [dʒɛ]	M— [tɕa]
$P_c \propto \overline{y\overline{x}}$	:	L— [dʒɛ]		
$P_? \propto \overline{y\overline{x}}$	:	M— [ʔɛ]	M— [ʔa]	
$N_p \propto \overline{y\overline{x}}$	:	M— [ma]	M— [mɛ]	
$N_t \propto \overline{y\overline{x}}$	:	M— [nə]	M— [nɛ]	
$\overline{v}_p \propto \overline{y\overline{x}}$	:	M— [wa]		

Disyllabic structures $\mathcal{O}CV$ and $\mathcal{O}\widehat{CCV}$.

Prosodies of the disyllables, apart from pitch prosodies, are similar to those of the monosyllable.

Pitch prosodies of the syllables function in a four term contrast:

H-M	(exponent: high and mid pitch)
F-M	(exponent: falling and mid pitch)
M-F	(exponent: mid and falling pitch)
M-M	(exponent: mid and mid pitch)

V and \mathcal{O} systems of disyllables are similar to those of the disyllables described in Stage III and will not be described again here.

C systems in $\mathcal{O}CV$, and $\mathcal{O}\widehat{CCV}$ are similar to those described in Stage III.

Selected examples with full formulae are given below:

$\underline{y\epsilon} \supset P_p \alpha \underline{y\epsilon}$	$\begin{array}{c} \text{M} \text{---} \\ \text{[apa]} \end{array}$	$\begin{array}{c} \text{M} \text{---} \\ \text{[ap\epsilon]} \end{array}$
$\underline{y\epsilon} \supset P_c \alpha \underline{y\epsilon}$	$\begin{array}{c} \text{M} \text{---} \\ \text{[adza]} \end{array}$	$\begin{array}{c} \text{M} \text{---} \\ \text{[adz\epsilon]} \end{array}$
$\underline{y\epsilon} \supset P_c l \underline{y\epsilon}$	$\begin{array}{c} \text{L} \text{---} \\ \text{[adz\pm]} \end{array}$	
$\underline{y\epsilon} \supset \widehat{PP}_p \alpha \underline{y\epsilon}$	$\begin{array}{c} \text{M-M-} \\ \text{[appa]} \end{array}$	$\begin{array}{c} \text{M-M-} \\ \text{[app\epsilon]} \end{array}$
$\underline{y\epsilon} \supset \widehat{PP}_c \alpha \underline{y\epsilon}$	$\begin{array}{c} \text{H-M-} \\ \text{[addza]} \end{array}$	$\begin{array}{c} \text{H-M-} \\ \text{[at\tau za]} \end{array}$

Pre-phonological description of the peripheral system of vocalizations

In the peripheral system, the elements of the syllable structure are C and V, and there are V and CV monosyllabic structures.

Monosyllabic structures

Prosodies of the monosyllables are as follows:

w	(exponent: backness)
r	(exponent: rounding)
<u>r</u>	(exponent: non-rounding)
n	(exponent: nasalization)
<u>n</u>	(exponent: non-nasalization)

This is different from the basic system, e.g. w, n, n prosodies do not function in the basic system.

Pitch prosodies. There is a contrast of three pitch prosodies:

H	(exponent: high pitch)
F	(exponent: falling pitch)
R	(exponent: rising pitch)

This is also different from the basic system, i.e. only two term contrast in the basic system, but three term contrast in the peripheral system.

Syllable final prosodies. There is a contrast of three prosodies:

- V^{cw} (exponent: complete stricture at velar place)
- V^{cw} (exponent: complete stricture at glottal place)
- V^{ew} (exponent: stricture of close approximation at velar place)

For example,

$C\alpha^{cw}$ [ʔa:ʒ] [ʔa^k]

$C\alpha^{ew}$ [ʔa:ʏ] [ɛ::^x]

α^{cw} [aʔ] [ɛʔ]

V system. The V system has a contrast of l (close grade) and α (open grade). These function with the above-mentioned prosodies, e.g.

$C\alpha^{yr}$ [pœ]

$C l^{yr}$ [pɤ]

$C\alpha^{y\bar{r}}$ [pɛ] [ʔɛ]

$C l^{w\bar{r}}$ [ʔo̥] [ʔu̥]

$\alpha^{w\bar{r}}$ [ɔ̥]

$C l^{w\bar{r}}$ [ʔu̥] [ʔɔ̥]

Combinations of l and α are possible, e.g.

$C V^{y\bar{r}} \frac{y\bar{r}}{\alpha-l}$ [ʔaɪ]

$\begin{matrix} \text{yr} & \text{wr} \\ \text{c} - \text{l} \end{matrix}$ $[\text{a}^{\text{r}}] \quad [\text{ɛ}^{\text{r}}]$

$\begin{matrix} \text{CV} & \text{yr} & \text{yr} \\ \text{c} - \text{c} \end{matrix}$ $[\text{pa}^{\text{r}}]$

C systems. The C systems of the monosyllables in the peripheral system are restricted to P (Plosive), N (Nasal), F (Fricative), V (Continuant).

P subsystem. There is one term: k (velar).

N subsystem. There is a two term contrast: c (palatal) and k (velar).

F subsystem. There is a four term contrast: p (labial), c (palatal), k (velar), and ? (glottal).

V subsystem. There is only one term: c (palatal).

The contrasts of the subsystems of C in the peripheral system of the monosyllable can be compared in Table 2.

Table 2. Contrasts at C in the peripheral system

P subsystem			k	
N subsystem		c	k	
F subsystem	p	c	k	?
V subsystem		c		

Selected examples of these contrasts are given below:

P_k^V	$[k\varepsilon]$ $[ka]$ $[g\varepsilon]$ $[ga]$
N_c^V	$[n\varepsilon]$ $[n\pm]$
N_k^V	$[n\pm]$ $[ne]$ $[n\varepsilon]$
F_p^V	$[\beta\alpha]$ $[\beta\varepsilon]$ $[\beta e]$
F_c^V	$[z\pm]$ $[z\varepsilon]$
F_k^V	$[y\pm]$ $[y\varepsilon]$ $[y\ddot{u}]$
$F_?^V$	$[h\pm]$ $[h\varepsilon]$
\forall_c^V	$[ja\pm]$ $[j\varepsilon]$

It can be seen that contrasts at C in the peripheral system are greater than those in the basic system (cf. Tables 1 and 2).

Conclusions

In Stage IV, the vocalizations become more restricted and less variable compared with those in the previous stages. So far the process of acquisition can be described as gradual and continuous. In Stage I, all the vocalizations were 'fluid' and variable; mainly 'non-checked' vocalizations were produced. In Stage II, strictures of complete closure at the alveolar place began to be used to interrupt the vocalizations of open approximation, but they were rather vaguely articulated; there was a gradual increase in screeching vocalizations with a combination of high pitch and normal registers. In Stages III and IV, closures were produced

but the 'non-checked' vocalizations were still in use. The screeching vocalizations appeared regularly as a 'singing tune'.

It appears that in Stage IV certain sounds and certain pitch patterns were beginning to be used functionally. These were found to be produced increasingly in the stages that follow.

Chapter 3

The Proto-Language

Stage V (0;8.00-0;10.15)*1

General Phonetic Description of Vocalizations in Stage V

The basic vocalizations in Stage V were similar to the previous stage, i.e. checked and non-checked vocalizations. However, there was progress in that in the 'checked' vocalizations there was also interruption of relatively long duration of friction and trill in harmony with the place of articulation of the complete closure. Stretches varied from short to long. The long stretches consisted of a maximum of five syllables. Nasalization with an open passage of mouth occurred occasionally, but the nasals, [m] [ŋ], appeared more frequently, and were produced in the same way as the series with friction and trill mentioned above, e.g. [m] was produced with long duration but with the lips not completely closed, [m:::::]. Sometimes the labial nasal was started without voice but with a breathy onset, e.g. [hm:::::]. Creaky articulation, [~~], was often heard with low [hm]tch. Occasionally velar friction was articulated clearly with a clearer vowel quality than before. It is interesting in that the velar friction in the forms of [ɣu⁺] and [aɣu⁺] was produced frequently, with vague quality, in the early stage, i.e. Stage I, and was rarely produced later on; the same velar syllables, however, became more frequently produced again.

*1 No recordings were made from 0;7.21-0;7.30 because of mechanical problems.

in this stage with clearer quality and longer duration, e.g.

he:: ^Y	a:: Yu ⁺	g ⁺ x::	a:: Yε::	a:: Y:: Yu ⁺
—	—	—	—	—

It is possible that the baby was again experimenting in the velar region after the time lapse.

The examples of the baby's vocalizations in this stage are given in Appendix 2.7.

With reference to pitch, the 'checked' and 'non-checked' vocalizations were produced mainly with mid and low pitches; falling and rising occurred occasionally when the syllables were accented, particularly when accompanied by loudness and when final in the stretch. Thus, as far as the pitch is concerned, those established in his basic system, i.e. mid and low, were the most frequently used in his general vocalizations.

Vocal play

The baby produced the 'singing tune' with mainly high and rising pitch, and also produced 'checked' and 'non-checked' vocalizations in his vocal play. In most situations, if he produced the singing tune, he paid no attention to what adults said to him (usually the adults asked him what he was 'singing' or commented to him about the 'singing'). He went on 'singing' until he was tired or until he was distracted by something else. However, in the general vocalizations, 'checked' and 'non-checked', he did listen to the adults' speech and responded to what was salient to him, e.g. syllables and sounds of his repertoire - frontness, plosives and affricates (cf. Appendix 2.7).

It was noticeable that when the baby was engaged in some physical activities or games, e.g. jumping (aided), peek-a-boo, etc., he became less vocal, but produced sounds showing pleasure or affectiveness.

Description of syllable patterns produced in this stage

Syllable patterns were of the following types:

- I. Close or open vowel with or without a glottal constriction or breathy onset, e.g. [ʔe, ʔa a hɪ].
- II. Checked onset followed by open (or close central) release either with short or long length. The places of articulation of the onset, with or without voice, were labial, alveolar, palatal, and velar, but velar seldom occurred, e.g.

[pa/pa:]	[ba/ba:]
[t̪a/t̪a:]	[d̪a/d̪a:]
[t̪ɕa/t̪ɕa:]	[d̪ʒa/d̪ʒa:]
[kɛ/kɛ:]	[ɡɛ/ɡɛ:]

- III. Open onset (or close central onset) followed by a firm contact, which was either long or short, and followed by open (or close central) release. The places of articulation were labial, alveolar, and palatal, e.g.

[appa/apa]	[abba/aba]
[a̠t̪a/a̠t̪a]	[a̠d̪a/a̠d̪a]
[a̠t̪ɕa/a̠t̪ɕa]	[a̠d̪ʒa/a̠d̪ʒa]

- IV. Open onset followed by long friction or trill which was weakened to no friction before release, e.g.

[aɸ:::::wa]
[aʒ:::::d̪ʒa]
[aɖr:::::d̪ʒa]

V. Checked onset followed by either close or open vowel followed by a homorganic checked ending, e.g. [p̌ɪp, bɛp, pɛp, pap, ťɪt, mam]. This kind of syllable pattern first appeared in this stage, and was produced in the vocal play. In other words, this pattern was still in his peripheral system.

By this time, the adults used some meaningful and short expressions in addressing the baby or in stimulating the baby to respond. (Previously they used sounds in the baby's repertoire or the adapted forms of conventional words.) These expressions were [ʔtɕa:] 'politeness particle', [ʔtɕa] 'politeness particle', [ʔmɛ:] 'mother', [ʔphɔ:] 'father', [ʔpa:] 'aunt', and names of objects and animals in his environment. Even though the baby responded to these expressions with similar features, it seems that he was not yet aware of their function until 2-3 months later. On the other hand, short vocalizations which appeared to suggest a set of functions were used systematically and consistently during the course of 'conversation' with adults. Such vocalizations will be termed 'proto-language' (Halliday, 1975).

The main characteristic of the 'proto-language' is the use of a set of short vocalizations with specific functions in interaction with adults. Such a means of communication is, thus, a breakthrough into 'language' in the sense defined by Halliday (Halliday, 1975:61) that

'It is not a linguistic system in the adult sense, since it lacks the defining characteristic of such a system, i.e. it is not tri-stratal. An adult linguistic system has three levels: semantics, syntax, and phonology.'

The proto-language is bi-stratal; it has semantics and a phonology. That is to say it has a content and an expression.

P's^{*} proto-language

P's 'proto-language' actually began around the end of the previous stage. It was produced systematically in that certain sounds with certain pitches had been used with a purpose, and were used consistently in a functional way. The term 'function' here is used in the sense of a system of meanings (cf. Halliday, 1975:5). The proto-language used by the child under study was in vowel form varying in quality from front to central, i.e. [a] [ɛ] [e] [ə] [ɪ], but quality from front to central, i.e. [a] [ɛ] [e] [ə] [ɪ], but [ɛ] appeared more frequently. These vowels were used with different pitches and sometimes with nasalization. The functions were distinguished by their different use in context, and by the use of pitch in the different contexts rather than by different vowel qualities.

The functions are as follows:

1. Inquisitive 'What is that?', i.e., asking.
2. Instrumental 'I want', i.e. demanding or requesting.
3. Affirmative 'I see' or 'Yes', i.e. acknowledging when function 1 or 2 has been responded to.
4. Informative a) 'Look here (there)', i.e. indicating the presence of persons, or objects which are 'usual' to him.
b) 'Look!', i.e. indicating something 'unusual'.

The first two functions, Inquisitive and Instrumental, were conveyed by the use of high or high with slight rising pitch; the third function, i.e. Affirmative, with mid or lower-mid pitch, and the fourth, Informative, with either high/high-rise or mid/lower-mid pitch depending on the context. In the 'usual' context, e.g. the child wanted to indicate the persons or objects he knew, mid or lower-mid pitch was used, but if he wanted to inform about something 'unusual',

* P is an abbreviation for Pui, the child under study.

e.g. strangers to him, or things in his environment that had gone wrong, high or high-rise pitch was used. All these functions were often accompanied by pointing gestures.

A summary of different pitches in relation to different functions is given in Table 1 below.

Table 1. Certain functions in relation to certain pitches

Functions	Pitches
Inquisitive	High (or high-rise)
Instrumental	
Informative b)	
Affirmative	Mid (or lower-mid)
Informative a)	

Interestingly enough, adults who were the child's interlocutors understood what he meant or wanted, and responded in a way that satisfied his intentions. If these functions were not responded to properly, the proto-language was used repetitively with quicker rhythm until he was satisfied. It was noticeable that in 'dialogues', most of the time it was now P who initiated the conversation.

The above-mentioned functions can be seen in the following situations (Inquisitive abbreviated to Inq, Instrumental to Ins, Affirmative, Aff, and Informative, Inf.):

Situation I. Before going to sleep, with his grandmother in her bedroom, P initiated this 'dialogue':

Grandmother

P

| nan swə khun ja:i |
| ˩ ˩ - - |

| ʔɛ̃: ʔɛ̃: | (Inq: pointing to
grandma's blouse)

'That's grandma's blouse.'

| ɛ̃: ɛ̃: | (Inq: pointing to
(maternal) grandfather's
photograph on the wall)

| nan ru:p khun ta: |
| ˩ ˩ - - |

'That's grandpa's photograph;

| sawatdi: khun ta: lɛu jaŋ a luk |
| - - - - - |

| ʔɛ:ʔ | (Aff)
| - |

'Has baby said 'Hello' to grandpa?'

| ʔɛ̃ | (Inq: pointing to his
great-grandfather's
photograph)

| nan ru:p khun thuət |
| ˩ ˩ - ˩ |

| ʔeʔ | (Aff)
| - |

'That's great grandpa's photograph'

| khap khun ta: thuət |
| - - - ˩ |

| ʔɛ:ʔ | (Aff)
| - |

'Yes, great grandpa.'

| ʔɛ̃ | (Inq: pointing to the
electric fan)

<p>| nan phat lom | | ˩ ˨ ˨ |</p>	<p>| ʔɛ̃ | ʔɛ̃˩a ʔaː | (Inq: pointing to the electric fan (again))</p>
--	--

'That's an electric fan.'

<p>| nan phat lom | | ˩ ˨ ˨ |</p>	<p>| ʔaːː | (Aff)</p>
--	-----------------------

'That's an electric fan'

<p>| nan tɕak | | ˩ ˨ ˨ |</p>	<p>| ʔɛ̃ː | (Inq: pointing to the sewing machine)</p>
--	---

<p>| nan tɕak | | ˩ ˨ ˨ |</p>	<p>| ʔɛ̃ːː | (Aff)</p>
--	------------------------

'That's a sewing machine.'

(Two more examples are given in Appendix 2.8)

It can be seen that a prosodic feature, i.e. pitch, plays an important role in the meaning system in P's proto-language.

The similar use of pitch in the proto-language of a child in the Chinese speaking environment has also been noted. Clumeck (H. Clumeck, Berkeley, 1975, personal communication), who is working on the acquisition of tones in Mandarin, told the writer that his subject, at around 24 months, used high pitch or high slightly rising, and falling pitch which could be analysed as being a reflection, or expression, of the child's emotive or affective states or moods. For instance, he used the high pitch when he was annoyed, puzzled, or wanted someone to do something for him, and used the falling or lower pitch when he was pointing to something, either to draw somebody's attention to it, or when he had found something for himself. However, nothing was said about the use of the vowel qualities.

Children in a non-tonal environment also use pitch contrast functionally. Halliday (Halliday, 1975) reports a meaning system acquired by his son, Nigel. From about 9 months old, the child had a meaning system of five elements of which two were vocalized and three were gestures. In the two that were vocalized, the same vowel quality was produced, [ø], but the different functions were conveyed by different levels of pitch, e.g.

[ø] mid-low falling to low - for 'let's be together'

[ø] mid-falling to low - for 'look!'

Around 19½ months when Nigel had acquired words, he adopted the intonation distinction of rising/falling. All falling tone utterances were mathetic in function, i.e. showing learning about environment, and all rising tone utterances were pragmatic in function, e.g.

red sweater - 'That's a red sweater' (mathetic)

water on - 'I want the water turned on.' (pragmatic)

The same kind of use of proto-language has been reported by Dore (Dore et al, 1976). From the data of English-speaking children, he observed that the children produced phonetically consistent forms which appeared to be intermediate between prelinguistic babbling and words. These forms were classified on the basis of four functions: affect expression, instrumental expression, indicating expression, and grouping expression. However, Dore did not report the use of pitch at this stage.

At the one word utterance stage, Dore (Dore, 1975) points out that there is a complex interaction of the phonemic patterns of words and the intonation patterns which distinguish the expression of intention from the expression of lexical content. For example, the word *mama* appears with three different intonations:

- mama with a falling intonation, when the child merely labelled his mother or some doll as the mother;
- mama with an abrupt rise-falling, to call his mother to to him when she was some distance away, but still visible to him;
- mama with rising intonation to ask if an object belonged to his mother.

Phonetic development in the later period of Stage V

When P was between 0;8.20-0;10.15, the writer was with the family; the observations and the recordings were made by the writer herself. P's vocalizations within this period will be described in two parts: the first covers the time when the writer first met him and heard him vocalize, the other, the period when P was deliberately taught and stimulated to produce new sounds.

At the time the writer first saw P, he had already mastered clicks, e.g. palatal clicks or alveolar clicks; these clicks were used when he was playing with his toy, jumping, or when he heard them produced by adults. Other established sounds were those in his basic system described earlier (cf. pp. 83-84).

In interaction, short stretches were produced, and most often P used his proto-language accompanied by pointing gestures. However, when he was happily playing with his toys, i.e. changing from one toy to another, the vocalizations were long and continuous but were often interrupted by distractions from other things in his environment or from his play things being dropped. In the latter distraction

he would use his proto-language to request or to inform about the incident. In the later period of this stage, the continuous vocal play appeared to be a 'revision' of sounds he had already developed or of sounds he was beginning to produce. Examples of these vocalizations are given in Appendix 2.9.

The most common pitches heard in the baby's vocalizations were mid and low, on accented and unaccented syllables. It was found that the falling pitch occurred more often without vowel length and loudness, e.g. $\left| \begin{array}{c} \text{in, na:} \\ \text{~ -} \end{array} \right|$, $\left| \begin{array}{c} \text{en, na} \\ \text{~ -} \end{array} \right|$.

Relationship between the adult models and the baby's responses

P was deliberately 'taught' to produce new sounds and words when he was 0;9.2. It happened consistently that if the words or sounds were too difficult for him to produce, i.e. they were not in his repertoire or there were too many phonetic contrasts involved for him to cope with at once (cf. Waterson, 1971:197-198), P did not respond. He was either quiet or he smiled instead. A similar phenomenon with other children has been reported in Ferguson and Farwell (Ferguson and Farwell, 1973). However, if the sounds addressed to him were in his repertoire, he always responded to them, varying from one sound to another corresponding to the adult models. From the diary kept over the period of the writer's visit, the acquisition of the new sounds and pitch can be seen as follows:

0;9.2 P's name was deliberately called in conjunction with a particle which was produced with prolonged falling pitch, e.g. $\left| \begin{array}{c} \text{pui xi:::} \\ \text{~} \end{array} \right|$. He responded to such an

expression as $\begin{array}{|c|} \hline \text{?u} \text{ : : : : } \\ \hline \end{array}$ or $\begin{array}{|c|} \hline \text{m} \text{ : : : : } \\ \hline \end{array}$ with a similar

pitch contour, and produced it every time he heard the falling pitch.

- 0;9.3 P was being taught $\begin{array}{|c|} \hline \text{m} \text{ : : : : } \\ \hline \end{array}$ 'mother', $\begin{array}{|c|} \hline \text{m} \text{ : : : : } \\ \hline \end{array}$ (no meaning) $\begin{array}{|c|} \hline \text{ma} \text{ : : : : } \\ \hline \end{array}$ 'to come'. (The last two were introduced not as new words but as easier alternatives to $\begin{array}{|c|} \hline \text{m} \text{ : : : : } \\ \hline \end{array}$). He did not respond to any of them, since the only labial nasal produced in this stage was long labial closure, e.g. $\begin{array}{|c|} \hline \text{m} \text{ : : : : } \\ \hline \end{array}$. However, three days later (0;9.6), he produced $\begin{array}{|c|} \hline \text{m} \text{ : ma} \text{ : : : : } \\ \hline \end{array}$, and a week later used it consistently

especially when he wanted to be fed.

- 0;9.4 $\begin{array}{|c|} \hline \text{?ja} \text{ : : : : } \\ \hline \end{array}$ (meaningless) was said to him frequently. $\begin{array}{|c|} \hline \text{j} \\ \hline \end{array}$ which was in his peripheral system began to be produced by P more often.
- 0;9.8 $\begin{array}{|c|} \hline \text{ph} \text{ : : : : } \\ \hline \end{array}$ 'father' was being repeated many times to teach him to call his father; P watched the mouth, rounded his lips, but made no sound except $\begin{array}{|c|} \hline \text{m} \text{ : : : : } \\ \hline \end{array}$ several times. $\begin{array}{|c|} \hline \text{pa} \text{ : : : : } \\ \hline \end{array}$ 'aunt' was also said to him often. He produced $\begin{array}{|c|} \hline \text{pa} \text{ : : : : } \\ \hline \end{array}$ in response.

The reason why he could not produce the word $\begin{array}{|c|} \hline \text{ph} \text{ : : : : } \\ \hline \end{array}$ seems to be because there are too many features involved for him to cope with, e.g. aspiration, backness and lip-rounding (back vowels had not yet been acquired in 'checked' vocalizations), and falling pitch.

0;9.10 [-na:] was said to him as a reduced form of [-noi-na:] 'custard-apple', while he was being given a piece of the fruit. He did not produce the sound but he could identify the custard-apple tree behind the house when it was referred to, i.e. he could perceive and recognize the word.

[-jai] was said to him as a reduced form of [-lam -jai] 'longan' in the same situation as above, but he did not attempt it.

A series of post alveolar rolls, [r:::], were produced to him; he responded as [x:::] and [ʏ:::].

0;9.12 [-phə] was said to him many times. He responded as [-pa:]. It seems that he perceived the closure and opening of [-phə], so he matched the articulation with the syllable already acquired in his repertoire, i.e. [-pa:]. Aspiration at this stage had not yet been acquired. This shows that the child perceived in terms of a syllable rather than the segments.

0;9.14 Nasals, e.g.

m:	ma
-	-

,

n:	na
-	-

,

ɳ	ɳa
-	-

 were produced

by P continuously.

0;9.17 P said [-mɛ:] as a response to the words [-mɛ:u] 'cat' and [-mɛ:] (meaningless). This was 14 days after [-mɛ:] was said to him for the first time.

0;9.21 [-la] and [-ɬ-la] had been said to him some days before but he had not responded to them. Now, however, meaningless words with lateral onset and open vowel were heard from P while he was being fed, i.e. [-la:], but when the

word was said to him he responded with [na:].

Once the writer said [-ʔ-la] to him while he was lying on his back (the reason for producing [ʔ] onset was to show him the position of the tongue). He watched the writer's mouth, i.e. tongue, and attempted to imitate the articulation, but all he did was to curl the tip of the tongue toward the inner side of the right gum.

No sound was produced.

By 0;9.23 lateral [l] and [ʎ], and nasal + vowel had been mastered in imitation.

0;9.26 P repeated all the consonantal sounds in his repertoire accompanied by an open vowel. However, [ʁphɔ:] 'father' and [-pɔ:] (reduced form of [-mɛ:ɣ-pɔ:] 'a kind of butterfly') were still ignored by P.

It was noticed that in addition to bilabial closure, P had another way of articulating the [p] sound which was by sticking his tongue between the lips and pressing the upper lip against the front of the tongue.

0;10.2 Glottalized syllables were heard in P's vocalizations, e.g. [-paʔ], [-taʔ]. (Most C₁VC₂ syllables in the adult system, where C₂ = [p, t, k, ʔ] are glottalized.)

0;10.5 As P now has five front teeth; three lower teeth, two upper teeth, [-fa:] (meaningless) was said to him. He responded to the syllable as [-ma:] or [-pa:] or [-pa:] - upper lip covering lower lip.

[-khə], which had been produced to him as a rhythmic beat when he was jumping and was produced by the child himself very frequently, at this time became associated with the word [-ma/khuə] 'egg-plant', i.e. only the last syllable

was produced by adults in addressing the baby.

0;10.16 [-s:::], [^tsa?], and [suə] were said to him respectively when he saw a butterfly, [/phi:suə] in Thai. He responded to [-s:::], which is non-labial, by using his own syllable patterns and non-labial sounds, e.g. |ʔa::: dʒa?|, |ja?|, or |na?|. (A detailed discussion of this will be given later.)

0;10.12 P was taught to blow (labial); when he was stimulated to blow harder, he responded with [-β:::] - either upper lip covering lower lip or lower lip covering upper lip.

[suə] as a reduced form of [/phi:suə] 'butterfly', was said to him again and again when drawing attention to butterflies; he acknowledged seeing the butterfly by using his proto-language, but once suddenly said |ʒua⁺| but did not repeat it, even when he was encouraged.

0;10.13 [β::], [f::], [v::], were produced by P when he was crawling to the electric fan. This was from the blowing taught to him which was related to the wind from the fan - it was not an attempt at the word for 'fan' which is [-phat -lom] with the accent on [-lom].

It can be seen that P was learning new sounds and new forms, i.e. combinations of sounds already acquired, quickly. He was using both visual and auditory perception for his planning and production. As an example, the relationship between labial models and the baby's forms produced in response are considered:


Models	Responses
<p>A [pa:] 'to throw'</p> <p>but meant to be [phɔ:] 'father'</p> <p>or [pa:] 'aunt'</p>	<p>[pa:], [p^ha:], [a-pa:], [p a:]</p>
<p>B [u: -wa:] (meaningless)</p> <p> [a: -wa:] (meaningless)</p>	<p>[a:-py:: -wa]</p> <p>[ɛ:u_wa:] or [py:: -wa]</p>
<p>C [mmɛ:] (meaningless)</p> <p>but meant to be [mɛ:] 'mother'</p>	<p>[mmɛ̃] or [m::mɛ̃]</p>
<p>D [pa::] 'aunt'</p> <p> [ma::] 'dog'</p>	<p>[m::::]</p> <p>[m::::] or [m::::]</p>

In A, the model was labial with exploded [p] onset accompanied by open vowel. There was no rounding in the model. The responses were made with a labial plosive and its homorganic variants. The openness of vowel was correctly responded to.

In B, it seems that a clear contrast between rounding and non-rounding was perceived, as labial sounds and rounding, in one form or another, were produced.








In C, the length of the labial nasal and of the whole syllable made the nasality and the openness salient, and P responded with a close match to the models. In all cases, P seemed to be responding fairly accurately to the vowel quality.

The models A, B and C were produced with either mid or low pitch and the baby responded with mid or low pitch, which was in his basic system. However, when there were onsets either in the form of a + CV or m + CV, the onsets were produced with any one of the fixed pitch patterns described earlier (cf. p. 64), that is to say, with one of his own patterns.

In D, the models were produced with falling and rising pitch; they were accented, and long. Even though the syllable types (sounds and pattern) were established in P's repertoire, he did not respond to them, but to the pitch contour of the syllable, i.e. falling pitch contour, he had been exposed to. In the case of  'ma::' 'dog', the rising pitch to P was still unfamiliar as a syllable feature, and he responded to it using mid or falling pitch.

In sum, labial sounds with open vowel were responded to by labial sounds established in his basic system, with variation in manner of articulation. Plosives and nasals were distinguished consistently and therefore were presumably perceived. Vowel quality was most often responded to fairly accurately.

Responses to the non-labial models in the first part of this period were also systematic. The non-labial sounds are those whose strictures are made at the alveolar, palatal and velar places. Most of the correct responses were those established in the basic system. In place of sounds in the peripheral system, however, the baby systematically used those in his basic system, e.g.

Models	Responses
[- ta]	[- ɔa:]
[- tɪlə], [- la:]	 ,  , 
[/tɕa:]	[dʒɛ:], [- dʒə], [- dʒa]
	 ,  , 

(See Appendix 2.10 for the use of these examples in different contexts.)

From the examples given it can be said that P had two ways of responding to non-labial sounds. Firstly, if the manner of articu-

lation from the model is more salient and is familiar, manner of articulation is planned for a response, e.g. nasals are responded to by nasals, or plosives by plosives. Secondly, if the manner of articulation is unfamiliar and hard to identify, but place is familiar, P produced same place but different manner, e.g. [d_ɹ] [n_ɹ] [d_ɹ] for [l], i.e. plosives, nasals, for liquid.

Manner of articulation has been reported to be normally more salient than place of articulation (Waterson, 1971, 1976), and the baby normally responded by using the same manner of articulation, but not necessarily the same place, e.g. in the last example given above, nasal manner and labial place were produced for nasal manner and velar place, i.e. [m] for [ŋ].

P's vocalizations both in vocal play and in interaction were similar to the earlier part of Stage V, but were more progressive in that [mma] [n_ɹna] were mastered, and were produced more repetitively in a new phonetic context in vocal play or when hungry e.g. [-mam] [ʔnan]. Moreover, [ʔjai], [ʔwau] and [ʔtɕaɪ] or [ʔdʒaɪ] were produced frequently in his vocal play, and were produced with tense jaws and with even rhythm. Syllables with final glottal check, and CVC structure appeared and were more strongly articulated. Backness and rounding features appeared with syllables with 'non-checked' onset. Examples of vocalizations and responses are given in Appendix 2.11.

Later in this stage, the expression which had been produced earlier by the adult, e.g. [-u-wa] or [-a-wa:] was adapted to the word [-wua] 'cow' and [-bua] 'lotus'. [-wua] appeared as one of his first words later on.

Pre-phonological description of the proto-language

The syllable structure of the proto-language consists of a V element. There is a two term contrast of V : l (close grade) and \mathcal{L} (open grade).

Prosodies of the syllable are as follows:

- c (exponent: stricture of complete closure)
- y (exponent: frontness)
- \underline{y} (exponent: centrality)
- n (exponent: nasalization)
- \underline{n} (exponent: non-nasalization)

Pitch prosodies are as follows:

- H (exponent: high or high-rising pitch)
- M (exponent: mid or lower-mid pitch).

The structure of the syllable of the proto-language may be represented as $\frac{H/M}{V} \frac{\mathcal{L}}{l}$ together with various combinations of the c , y , \underline{y} , n , \underline{n} prosodies.

The functions are listed below:

- Function I Inquisitive function
- Function II Instrumental function
- Function III Affirmative function
- Function IV $\begin{smallmatrix} A \\ \leftarrow B \end{smallmatrix}$ Informative function

The H and M prosodies are restricted to certain occurrence of the functions:

- H prosody is found with Functions I, II and IVB
- M prosody is found with Functions III and IVA.

The functions are determined by the context, as explained on p. 97.

Examples with H, M, c, y, ɹ, n, n prosodies are given below:

$\begin{matrix} H \\ c \\ V \\ \alpha \end{matrix} \begin{matrix} y \\ n \end{matrix}$	$\left| \begin{matrix} ? \\ \xi \end{matrix} \right|$	II	Instrumental: the child wants something or asks about something.
$\begin{matrix} H \\ V \\ l \end{matrix} \begin{matrix} y \\ n \end{matrix}$	$\left| \begin{matrix} \sim \\ - \end{matrix} \right|$	II	Instrumental
$\begin{matrix} M \\ V \\ \alpha \end{matrix} \begin{matrix} y \\ n \end{matrix}$	$\left| \begin{matrix} \sim \\ \epsilon : \\ - \end{matrix} \right|$	IVA	Informative: the child informs about what is happening.

Conclusions

This stage is a crucial stage in that within two months and fifteen days, several important features appeared as a preparation for language. The proto-language occurred, that is, the systematic use of vocalizations with specific functions. Furthermore, some basic features of the conventional system began to appear, e.g. syllable with final glottal constriction and a C_1VC_2 structure. Rising pitch which was not as yet used in vocal interaction began to appear in P's vocal play.

Articulatory ability for the production of new sounds in response to the models had also increased. It has been seen that the learning of new sounds was fairly quick, and once they are learnt, they are used in imitation.

The ways of imitating the models are also systematic, which shows that the child genuinely plans his responses. In this stage, the labial sounds are always responded to by labial sounds, either oral or nasal, but for the labial-nasal, the responses are always nasal. The non-labial sounds seem to be more difficult for the child to produce. He therefore has his own systematic way of responding.

Stage VI (0;10.16-0;11.12)

General Phonetic Description of Vocalizations in Stage VI

In this stage, the proto-language, which had been in use since Stage IV was still in use in interaction with adults. Verbal attempts in response to the adult models, which first began to appear in the previous stage, increased. Long series of babbling were still regularly produced as vocal play. Therefore, the child's vocalizations were of three kinds: proto-language, responses to models, and vocal play.

The vocalizations in the proto-language and in responses were short, i.e. only one-syllable stretches were produced; but in vocal play, long continuous stretches were heard. It happened regularly that in interaction with an adult, the child sometimes imitated the word produced by the adult, sometimes used the proto-language, and sometimes remained quiet.

Pitch levels used in his proto-language were the same as those mentioned in the previous stage. The pitch used in imitating the adult models was restricted mainly to low and mid, i.e. those established in his basic system, irrespective of the pitch levels in the adult models. However, occasionally falling, rising, and high pitches were produced. These three pitches were consistently accompanied by loudness and length of vowel.

In the continuous babbling vocal play, screeching vocalizations and the singing tune with contrast of high pitch register, normal pitch register, and energy exerting, were seldom produced. The pitch of vocal play, however, varied among low, mid, high, rising, and

falling. Sometimes one level of pitch was produced continuously before changing to another.

The consonantal sounds which occurred in the 'checked' and 'non-checked' vocalizations were similar to those mentioned in the previous stage. However, in this stage, there was progress in that the palatal semivowel [j], which was previously in his peripheral system, appeared to be used more regularly and consistently than before. Therefore, it is possible to say that [j] had now become a sound in his basic system. Thus, the consonantal sounds in his basic system at this stage were:

Labial	p	b	m	w
Alveolar	t	d	n	
Palatal	tʃ	dʒ	j	

It has to be noted that [j] was produced with tense jaws and with glottal constriction at syllable onset. The glottal onset feature for [j] is basic in the conventional language. This feature has been noted by Henderson (1964) in her auditory judgment of the [j] sound in Thai; she found that the sound preceding [j] was a weak glottal stop. Thus in this stage, one of the basic features of the Thai sound system, [ʔj], appeared.

In the proto-language, voiced and voiceless breathy onset occurred with mid or lower-mid pitch to imply 'Informative' and 'Affirmative' functions, e.g. [-ha], [-hə]. Breathy onset was still produced in non-vocalizations, e.g. laughter, protest cry. Sometimes, however, syllables with checked onset have a breathy release accompanied by voicing or without voice. The release took place in the following forms:

$\left[\begin{smallmatrix} p^h a: \\ - \end{smallmatrix} \right], \left[\begin{smallmatrix} p^{\phi} ha \\ - \end{smallmatrix} \right], \left[\begin{smallmatrix} bha: \\ \sim \end{smallmatrix} \right], \left[\begin{smallmatrix} d_{\phi}^h \varepsilon: d \\ - \end{smallmatrix} \right]$

The articulation of labial plosives was of two types depending on the way the release was made: exploded with slight vibration at the lips $[p^{\phi}]$, $[b^{\phi}]$ or without vibration at the lips, e.g. $[p^h]$, $[b^h]$, $[p]$. This will be shown to lead eventually to the acquisition of aspiration of the voiceless plosives in Thai.

With regard to vowels, frontness with variable degrees of openness, e.g. $[e]$ $[\varepsilon]$ $[a]$ was still predominant. Sometimes diphthongs $[e\ddot{u}]$, $[\varepsilon\ddot{u}]$, $[a\ddot{u}]$, $[e\ddot{i}]$, $[\varepsilon\ddot{i}]$, and $[a\ddot{i}]$ occurred. Later in this stage, back and rounded vowels, e.g. $[\ddot{o}]$ $[\ddot{u}]$, which appeared in the previous stage with non-checked onsets, $[j]$ l h , occurred with checked onset syllables. The front rounded $[\bar{y}]$ which appeared previously with labial friction, $[\beta]$, appeared to be more retracted, i.e. somewhat like $[\upsilon]$, e.g. $[\beta\upsilon]$.

Most of the syllables in P's vocalizations were open, i.e. ending with a vowel. However, closed syllables, i.e. with a consonantal ending, appeared gradually and more frequently than in the previous stage, especially the final glottal check $[ʔ]$. Syllables with a final glottal check were mostly accented, and had a short vowel, and most consistently occurred with low pitch. All these phenomena led to the acquisition of closed syllables with unreleased final closure, a feature of the conventional language. Incidentally, once or twice in response to the adult's word of C_1VC_2 structure (where C_2 = stop), P produced a form similar in sound, structure, and final unreleased consonant, e.g. $[d_{\phi}agʔ]$ as an imitation of $[t\phi ak^1]$ (cf. a detailed example of imitation in Appendix 2.12).

Relationship between adult models and the baby's responses

This was the first period when a number of meaningful words - 67 words - were addressed to him. They were words used in his daily routine, words concerning members of the family, and words about objects, animals, or pictures which attracted P's attention.

In spite of his limited ability both in perception and production, P imitated most of the words addressed to him. The imitation appeared to correspond to the models in terms of the following contrasts:

1. Labial/non-labial articulation
2. Closeness/openness of syllable
3. Frontness/backness of syllable
4. Rounding/non-rounding of syllable
5. Initial oral/initial nasal.

In general, it may be said that the child's responses depended greatly on what was auditorily and visually salient for him in the model. In a disyllabic model, P appeared to have a bigger problem since both syllables of the disyllabic model may be different in place, manner, pitch level, and accentuation, i.e. more contrasts are involved. However, the responses appear to have been made in the same way as in the previous stage. For example

Models	Responses ^{*1} (With mid or low pitch unless indicated otherwise)
[-tɕam -pa:] 'a kind of flower'	[əp ^h ɪ:, p ^h ɛa, bɕa:]
[-mɛŋ -pɔ:] 'a kind of butterfly'	[pɛ]
[-ka /pɔŋ] 'a tin'	[h ^h ɪpwa, pua:, ɬ ^h ɪp ^h ɪ]
[-nɔ:n -phak] 'to lie down and rest'	[pɛɛ:, p ^h ɪ, -ba:k, -ə ^h ba:k]

*1 Responses are given in order from the first attempt to the latest.

In the examples above, it can be seen that labial articulation in the model appears to be salient for the baby. This may be because the second syllables of the disyllabic words are accented and have plosive onset, plosives in accented position being relatively salient (cf. Waterson, 1976). Labial articulation is visually salient, and the baby responded with labial articulations, sometimes plosive and sometimes fricative.

In the following examples, the baby appeared to vary in his responses from labial to non-labial probably depending on which part of the adult utterance he was giving most attention to at the time he was addressed.

Models	Responses ^{*1} (With mid or low pitch unless indicated otherwise)
(1) [ˈphat ˈlom:] 'electric fan'	[ppa:, ap ^h a, m ⁿ ma]
(2) [ˈthap ˈthim:] 'pomegranate'	[mmɛ, ma, dʒɛ]
(3) [ˈmot ˈkat] 'ant, bite'	[ʔpaʔ, dʒa:, adʒa]

In these examples, the second syllables are also accented and in cases where the labial nasal is present, the nasal is prolonged, thus making it more salient. Therefore, there is a tendency for nasality to be responded to by the baby who had already seemed to perceive nasality very consistently in the previous stage. However, in (1) the place and manner of articulation of the syllables with the labials are also familiar; the baby, thus, responded to the model with both oral and nasal labial.

In (2), the place and manner of articulation of both syllables are familiar, therefore P varied his responses from nasal-labial to

*1 See footnote 1, p. 117.

oral non-labial.

In (3), the place and manner of the first syllable are familiar, but the second syllable is more accented. P responded to the manner of articulation and to the quality of the vowel in the second syllable, but produced it with the familiar place of the first syllable, so [ʔpaʔ] was produced. Other times, the responses corresponded to the second syllable which has unfamiliar place of articulation, but familiar manner. Thus, P used his familiar place for the unfamiliar one, i.e. [dʒa:] for [kat]. It is noticeable that final stops of the models have not yet been responded to. They are un-exploded in the Thai language, and thus non-salient.

It has been mentioned before that P responded to most of the models addressed to him but not to all. Examples to which P did not respond are given below

Models	Responses
[-na: -li-ka:] 'clock'	None
[-na:u] 'reduced form for -ma-na:u 'lime'	"
[\kha:u] 'rice'	"
[-kai] 'chicken'	"
[/naŋ /su:] 'book'	"
[/khan] 'to crow, water bowl'	"
[\kɛ:u /tɕa:] 'parrot + polite word'	"
(a special collocation for P)	
[-kra tɕok] 'mirror'	"
[-wit -tha -ju?] 'radio'	"
[-mai -khi:t] 'matches'	"
[-ta:i] 'rabbit' (-kra ta:i)	"
[-kuk -kai] (onomatopoeia for chicken)	"

These words are more complicated for P in terms of number of syllables, unfamiliar words, unfamiliar articulations, i.e. velar. This provides additional support for what had been said previously, that P ignored or did not respond to what was too complicated for him.

Pre-phonological description of vocalizations in Stage VI

The pre-phonological description of vocalizations in this stage is not much different from that in Stages IV and V except that there is progress in structure, prosodies of syllables, and contrasts of the systems.

The consonant-vowel-consonant pattern, where the final closure was treated as a syllable prosody, e.g. as CV^{CW}, is now treated as a CVC structure because there is greater system of contrasts in final place. This structure, however, is only found in the peripheral system.

The subsystems of C-initial and C-final of the CVC structure are restricted to P, and N, i.e. PVP and NVN. There is a three term contrast at P-initial, i.e. p (labial), t (alveolar), and c (palatal). At P-final, there is a three term contrast, i.e. t (alveolar), k (velar), and ʔ (glottal). There is a two term contrast at N-initial and final, i.e. p (labial) and n (alveolar).

For example:

P _p V P _ʔ	[^L paʔ]
P _t V P _ʔ	[^L tʔ], [^L dʔ]
P _c V P _k	[^L dʒaɡ]

$P_c V P_t$	$\begin{matrix} \text{L} \\ \text{---} \\ [d_{\text{z}} \epsilon^d] \end{matrix}$
$P_c V P_{\text{?}}$	$\begin{matrix} \text{L} \\ \text{---} \\ [d_{\text{z}} a^?] \end{matrix}$
$N_p V N_p$	$\begin{matrix} \text{L} \\ \text{---} \\ [mam] \end{matrix}$
$N_t V N_t$	$\begin{matrix} \text{R} \\ \text{---} \\ [nan] \end{matrix}$

V system. In the basic system, L and R function with a further two syllable prosodies: w (exponent: backness), and r (exponent: rounding). Therefore, by Stage VI, the syllable prosodies of the basic system are:

y	(exponent: frontness)
y	(exponent: centrality)
w	(exponent: backness)
r	(exponent: rounding)
r	(exponent: non-rounding)

C system. In the V subsystem of C in the basic system, the contrast is now of two terms (there was only one term in Stage IV) i.e. p (labial) and c (palatal).

Conclusions

In this stage, the baby used the proto-language, which had been established since Stage IV, in interaction with adults, imitated 'words', and produced vocal play. It is seen that by this stage, i.e. by 0;11.12, the baby's understanding of the adult's speech is considerable. This must be the result of his cognitive development (Slobin, 1973), and of help from the adults since the functions of things in his environment were repetitively explained to him as well

as the places where objects belong. In interaction, it was evident that P also knew which word he was expected to reproduce. For example, in one example (cf. Appendix 2.12(d)), when F was persuading P to play at the sewing machine table, P crawled to the sewing machine when he heard the word. If he did not understand the word, he would not have crawled back to the machine, and would not have responded with the word [-dʒaŋ] ([tʃak]'sewing machine'). He could have responded to the particle [-pai] as [-pa:] or whatever it may be, (cf. the fourth utterance, Appendix 2.12(d)) as [-pai] is last in the utterance, and the labial plosive is established in his repertoire, but he responded to the word [tʃak] instead.

Planning strategies in response to adult models are similar to those described in the previous stage, but articulation of sounds is more refined. One consistent way of production in imitation is by starting softly first, as if he was not sure; then going louder and louder.

Phonetic progress, which appeared further advanced from the previous stage, is seen in the consistent use of [ʔj] with the conventional quality, i.e. with glottal onset. Thus, [ʔj] is now established in his basic system and will be used widely in a meaningful context later on. Another basic feature of the adult system which appeared in the child's peripheral system is the unreleased finals of C₁VC₂ structures.

In this stage, there is also a sign of the production of aspiration which had not appeared before. This will gradually be used in the next stage. Moreover, in this stage back rounded vowels began to appear in 'checked' onset syllables.

C h a p t e r 4

The One Word Utterance Stage

Stage VII (0;11.13-1;1.02)

General Phonetic Description

At this stage, the general picture of P's vocalizations was similar to that of the previous stage. That is, the functional use of proto-language, imitation of heard utterances, and vocal play. However, in this stage progress in some features of the conventional language was remarkable. It was the starting point of first words; aspiration began to be produced in imitation; rising pitch appeared more frequently; the use of back rounded vowels with 'checked' and 'non-checked' onset was increased; and final glottal constriction occurred consistently with low pitch (what has been called 'low' pitch is phonetically low-falling pitch).

In addition to functional use of proto-language, i.e. certain vowels were used with certain pitches and with specific functions, the instrumental function, in the form of requests for food appeared to be signalled by words in the conventional form and in 'baby talk'. The first words, either in conventional form or in the form of 'baby talk', were produced initially by the baby in a spontaneous situation. From this period onwards, P often produced the baby talk for food [mam mam] or [mɔm mɔm], or [mam mɔm], i.e. backness and rounding features were used within a familiar phonetic context, to indicate that he was hungry, also to signal that he wanted more food. Occasionally, P used lexical words to convey the instrumental function for food, objects, or activities that he needed. For example, he

produced the word [-dʒa] for [-thuə] 'pea-nut' when he saw pea-nuts or heard the word being said and wanted some. He also produced the word [-ʔɔʔ] for [-ʔɔ:k] 'to go out' when he wanted to go out. Whenever he saw his picture book on animals, he used the word [-wua] for [-wuə] 'cow' to signal that he wanted the book. Later in this stage, when he saw pictures of a cow or an elephant he said [-wua]. These words were his first words. However, [-mam mam] occurred more frequently than [-dʒa] and [-ʔɔʔ] which occurred only once.

The production of aspiration was a gradual development from the previous stage. As mentioned earlier, the production of voiceless labial plosive, [p], was achieved in three forms: [-p^ha], [-pa] [-p^ha]. Similarly in this stage, P consistently responded with either friction or with aspiration to adult words with aspiration, e.g. [-βɔ:] for [-phɔ:n] 'Porn', name of the lady cleaner. When he responded with aspiration, the whole word was pharyngalized.

Rising pitch, which occurred in the vocal play in the previous stage, appeared to be practised more frequently in this stage, with prolongation of vowel and pitch without a change in vowel quality. Furthermore, the rising pitch began to be used in connection with some already acquired syllable patterns, e.g.

mmɛ:	,	m:ma:	,	dʒa:
- /		- /		/

 It may be noted that these forms occurred

before with mid or low pitch.

The increase in the use of the back rounded vowels is another step in the development from the previous stage. The baby began to produce the same patterns with different vowels. For example, he produced

mmɔʔ	|
- -	

 in addition to

mmaʔ	|
- -	

 or

m:mɛʔ	|
- -	

. Furthermore,

backness and rounding began to appear in the proto-language in addition to frontness, centrality, and non-rounding which had been in use. That is to say, he used [u] [o] [ɔ] in addition to [a] [ɛ] [e] [ɪ] in the affirmative and informative (usual) functions. In response to the adult models, backness and rounding features appeared to be perceived and produced in correspondence to the model, e.g.

| ʔwɔ: |	in response to	| phɔ: |	.
-		\	.

and the baby's forms is to be discussed later.

In accented syllables produced by the baby, syllables with low pitch often occurred in connection with final glottal check of which a breathy release was audible. It could be assumed that for him, low pitch (low-falling) had a concomitant glottal constriction regardless of the length of vowel, i.e. either short or long. The concomitant glottal constriction of falling (high-falling) and high tones in a pre-pausal position of the conventional system of tones in Thai has been reported on auditory and acoustic evidence (Henderson, 1964; Abramson, 1962), but not for the low tone. However, since neither the high-falling nor high tone had been acquired by the baby at this stage, and since the baby used low tone in response to the falling tone most of the time, it is possible that these two tones, falling and low, i.e. high-falling and low-falling, have a common feature which was salient for the baby, viz. low pitch ending and downward movement. This matter is to be discussed in Stage VIII.

In his vocal play a wide range of sounds was produced. Closed syllables occurred frequently. Low and mid, and rising pitches were produced most often, whereas the production of falling pitch was rare.

Relationship between adult models and the child's responses

The relationship between adult models and the child's responses may be seen from the three examples that follow. The situations were those of the reading and recitation of alphabet rhymes. A Thai alphabet rhyme was read to the child, and he attempted to imitate verbally. It can be seen that in this kind of situation, turn-taking was conducted consistently, and there was progress in the imitation of the alphabet rhyme.*1

Example I (1;0.11)

Grandmother*2

P

(GM uses normal pitch register except when high and rising tones were produced, high pitch register was used)

| kɔ: kai |	[ k ]	| dɔ: ^b ua |
- -		- -
| khɔ: khai |	[ kh ]	| ^w pa: |
- -		- -
| khɔ: khuət |	[ kh ]	| ɛəwa |
- -		- -
| khɔ: khwa:i: |	[ kh ]	| ɛə: |
- -		- -
| khɔ: khon: |	[ kh ]	| ɛ: dɛ |
- -		- -
| khɔ: la khay*3 |	[ kh ]	| ɛ: ^l ja: ʔja: |
- -		- -

*1 There are 44 alphabet letters, but the interaction usually stopped before the end.

*2 Henceforth, 'GM' will be used for 'grandmother'.

*3 [-khɔ: -ra -khay] conventionally.

GM

P

| ɣɔ: ɣu: | [ɣ]

| ʔutɕa:ʔ |

| tɕɔ: tɕa:n | [tɕ]

| ʔɛ: |

| tɕɔ: tɕa:n | (repeats)

| ʃa:ʔh: |

| tɕhɔ: tɕhiŋ | [tɕh]

quiet

| tɕhɔ: tɕha:ŋ | [tɕh]

quiet

| tso: tso: | [s]

| ɕɛ: |

| tɕhɔ: ka tɕhɔ: | [tɕh]

| dʒa: |

| ʃɔ: phu: ʃiŋ: | [ʃ]

| ɛdʒa: |

| dɔ: tɕha da: | [d]

| dʒa: |

| tɔ: patak | [t]

quiet

| tho: tha:n | [th]

| dʒəʔ |

| tho: naŋmon tho: | [th]

quiet

| tho: phu: thau | [th]

| ʔɛ::^h |

| nɔ: ne:n | [n]

| da: |

GM

do: dek
- -

[d]

to: tau
- -

(repeats twice)

tho: thun:
✓ -

[th]

tho: tha:n:
✓ -

[th]

tho: thon:
- -

[th]

no: nu:
- ✓

[n]

bo: bai ma:i:
- -

[b]

po: pla:
- -

[p]

repeats

repeats

P

tca:?
- -

quiet

gε:
- -

ga:
- -

gε:
- -

εε:
- -

hū: h:
- -

ʔm:::
- -

ʔm:::
- -

a:pwε:
- -

Example II (1;0.14) (P was also being distracted by Porn who was working nearby)

GM

ko: kai
- -

ko: ka:i:
- -

P

dze^{h:} (attention being drawn
to the book)

hε
- -

GM

P

| khɔ: kha:i: |
| ✓ — |

| hɛ |
| ✓ |

| khɔ: khuət |
| ✓ — |

| ʃʃə |
| — |

| khɔ: khon |
| — — |

| dʒa: |
| — |

| khɔ: la^{*1} khaŋ |
| — — — |

| ədʒɛ |
| — — |

| ŋɔ: ŋu: |
| — — |

| dʒa: |
| — |

| tɕɔ: tɕa:n |
| — — |

| dʒa: |
| ✓ |

| tɕhɔ: tɕhiŋ |
| ✓ — |

| dʒa: |
| — |

| tɕhɔ: tɕha:ŋ |
| — — |

| dʒɛ: |
| — |

| t_{so}: t_{so}: |
| — \ |

| a¹ jɛ? |
| — — |

| tɕhɔ: ka tɕhɛ: |
| — — — |

| dʒə |
| — |

| jɔ: phu jɪŋ: |
| — \ ✓ |

| əd̥d̥ə |
| — — |

| dɔ: tɕha da: |
| — — — |

| d̥rɛ: |
| — |

| tɔ: pa tak |
| — — — |

| d̥rə |
| — |

*1 [-ra] conventionally.

GM

tho: tha:n |
 - -

tho: naŋ mon tho: |
 - - - -

repeats

tho: phu thau |
 - \ \

no: ne:n |
 - -

tho: phu thau |
 - \ \

no: nen |
 - -

do: dek |
 - -

to: tau |
 - -

tho: thuy |
 - -

tho: tha ha:n |
 - - -

tho: thoy |
 - -

no: nu: |
 - -

bo: bai ma:i |
 - -

P

dri dre::[±] |
 -

?m |

ε: εddrε: |
 - -

ε: |
 -

quiet (Pom is laughing

because of his 'reading')

quiet

?ε: |
 -

da: |
 -

da: |
 -

th::ε |
 -

da: |
 -

trε |
 -

?ε: |
 -

?ε |
 -

GM

P

|pɔ: pla:|
| - - |

ʔɛ

|phɔ: phuuŋ|
| ✓ - |

ʔɛ

|phɔ: pha:n|
| - - |

ʔɛ

|phɔ: sam phau|
| - / - |

ʔɛ

|mɔ: ma:|
| - - |

ʔɛ̃

|jɔ: jak|
| - - |

jɛ:

|lɔ: liŋ|
| - - |

ʔɛ

|wɔ: wɛ:n|
| - / - |

|ɛ:jɛ|
| - - |

|sɔ: khɔ: sa: la:|
| ✓ - / - |

|aʔjeʔ|
| - - |

|sɔ: bɔ: lu tsi:|
| ✓ - - ✓ |

dʒɛ

|tɔ: tɕuə|
| ✓ / - |

ɛa:

|hɔ: hi:p|
| ✓ - - |

ʔɛ^h:

repeats

ʔɛ

|ʔɔ: ʔa:ŋ|
| - - |

hɛ

GM

hɔ: nok hu:k
- ˊ

ta: to:
- -

P

ha:
-

d_oɛ:h d_oa:h d_oa:h d_oa:h
- - - -

'big eyes' (a connecting rhyme of the
previous line to describe
an owl)

Example III (1;1.1) (P pays less attention because he wants
something else)

GM

kɔ: kai
- -

khɔ: khai
ˊ -

khɔ: khuət
ˊ -

khɔ: kha:i
ˊ -

khɔ: khon
- -

khɔ: la^{*1} khay
- - -

ɣɔ: ɣu:
- -

P

no response

"

"

"

"

"

"

*1 [-ra]

GM

| tɕɔ: tɕa:n |
| - - |

| tɕhɔ: tɕhiŋ |
| - - |

| tɕhɔ: tɕha:ŋ |
| - - |

| sɔ: sɔ: |
| - - |

| tɕhɔ: ka tɕhɔ: |
| - - - |

| jɔ: phu jɪŋ |
| - - - |

| dɔ: tɕha da: |
| - - - |

| tɔ: pa tak |
| - - - |

| thɔ: tha:n |
| - - - |

| thɔ: naŋ mon thɔ: |
| - - - - |

| thɔ: phu: thau |
| - - - |

| nɔ: ne:n |
| - - |

| dɔ: dek |
| - - |

P

| ɛddɛa: |
| - - |

| tɕɛ^h |
| - - |

| dri^h dzɔ |
| - - |

| kxa:^h |
| - - |

no response

| ɕɔ: jau lɛ |
| - - - |

| m:: nɛ^h dɛa? |
| - - - |

| tɛa^h |
| - - |

| dɔ:^h |
| - - |

| tɛa:^h (softly) |
| - - |

| tɛa:^h |
| - - |

| tɛa^h |
| - - |

| dɔ? |
| - - |

GM

| tɔ: tau |
| - - |

| thɔ: thun |
| ˘ ˘ |

wuə

P

t^rh:

quiet

| p^hu?ɔu |
| - - |

(Not in the alphabet rhyme. GM
suddenly changes to the 'crow'
rhyme.)

In response to the alphabet rhymes, the child used familiar syllable structures, i.e. CV or əCCV, or əCV. Syllable onsets and vowels were also familiar. The ending produced in this situation was a glottal stop which most often appeared with syllables produced on a low pitch. The already acquired pitches were often produced. That is to say mid and low pitches had priority in production, and it appears that the child was now in the stage of experimenting with the production of the rising pitch. The familiar phonetic context in which rising pitch was produced to the child was in a form with checked onset and open vowel, i.e. [tɕa:], a politeness particle. Thus, the child often used these features, i.e. checked onset with open vowel, e.g. [ɟa:], [dɕa:], [ɕa:], in his production regardless of the actual tone in the adult models (cf. Examples I, II). Yet it has been clearly seen that when minimal attention was paid to the model, the rising pitch was rarely produced (cf. Example III).

In order to be successful in eliciting responses, the child's attention is very important. Lewis (1936) also noted that the early

vocal responses to adult speech occurred most readily when the child was attentive to the speaker. In Example I, the child was not distracted by other things in his environment; in spite of his minimal linguistic ability, he paid attention to what was addressed to him and produced responses most of the time. However, he stayed quiet when the model was too long or unfamiliar. In Example II, the child was partly distracted by the presence and the action of another person, so he did not pay much attention to the rhyme. Instead, a repetitive expression, [ʔə] with high or rising pitch, was produced so as to keep the turn-taking role going. Superficially, it looks as if such an expression was his form of the proto-language used with a 'turn-taking' function, but it is not possible to assume that it was since he did not use it in this function elsewhere.

In Example III, P paid minimal attention to the model, and stayed quiet part of the time. However, since his linguistic ability was slightly higher, the responses he made were closer to the models in terms of phonetic features and number of syllables, e.g.

| ə: ɔu ɔ |	for	| ɔ: ɸu ɟi |
| - - - |		| - \ ɹ |

and

| m: nɔ ¹ daʔ |	for	| dɔ: tɕha da: |
\ - -		- - -

In sum, by this stage the relationship between the adult models and the child's responses are close in terms of the following contrasts:

1. Labial/non-labial
2. Frontness/backness
3. Closeness/openness
4. Rounding/non-rounding
5. Initial oral/initial nasal

For example

<u>Models</u>	<u>Meanings</u>	<u>Responses</u>	<u>Corresponding features</u>
| bɔ:n | | - |	dog's name	| wɔ: | | - |	labial, backness, openness, rounding, initial oral
| wuə | | - |	'cow'	| awua | | - - |	labial, backness, closeness and openness, rounding and non-rounding, initial oral
| mɛ: | | \ |	'mother'	| mmɛ | | - - |	labial, frontness, openness, non- rounding, initial nasal
| jak | | - |	'demon'	| adʒa? | | - - |	non-labial, frontness, openness, non-rounding, initial oral
| tɕak | | - |	'sewing machine'	| dʒa? | | - |	non-labial, frontness, openness, non-rounding, initial oral
| tɕa: | | / |	'politeness particle'	| dʒa: | | / |	non-labial, frontness, non- rounding, initial oral.

Apart from the correspondences described above, it can be seen from the data that syllables with long vowels are responded to as open syllables, and syllables with short vowel or with stop endings are responded to mostly with final glottal check.

With regard to tones^{*1} in the child's basic system, at this stage he had a contrast of mid/low which was also distinguished by the presence and the absence of final glottal check, i.e. low with

*1 In this stage, mid and low pitch are used at the lexical level in his first words, therefore these pitches are now classed as tones.

glottal check, mid without. Rising pitch was being acquired, but was not consistently produced. Thus, in response to the different tones in the adult system, the child had the following tones/pitches:

low (or mid) for low, high, falling
mid (or low) for mid (or low)
low, mid, rising for rising.

Pre-phonological Description of Vocalizations in Stage VII

The pre- phonological description of the basic system of vocalizations in Stage VII is similar to that of Stage VI. However, the monosyllabic V structure drops out of the basic system; the CVC monosyllabic structure becomes a basic word structure in the basic system. This structure functions as follows:

The CVC word structure is restricted to PVP and NVN. In the P subsystem, both initial and final, there is only one term: ? (glottal), e.g. P_?VP_? - [-ʔʔ]. In the N subsystem, both initial and final, there is only one term: p (labial), e.g. N_pVN_p - [-mam].

Conclusions

This stage, i.e. the period of the first recognizable use of Thai words, shows less progress in articulation but more in other features of the conventional language, and in language use. The development of these basic features, e.g. aspiration, final glottal check, and rising pitch, is not an abrupt process. They appeared

gradually and became more and more consistently used, e.g. some of these features actually began to appear in Stage V, and gradually came into use, and were more frequently produced, and thus, in all likelihood, more correctly perceived in this stage.

Stage VIII (1;1.03-1;2.24)General Phonetic Description

It was pointed out in the previous stage that P had started using his first words of the conventional language. In the present stage, the child appeared to produce one word utterances more frequently, and developed from being merely 'vocally active' to more 'verbally active'. That is to say, speech was now used to replace some more of the uses of the proto-language. The spontaneous production of words was conventional and meaningful in a context either when P himself initiated the conversation or when the adult did.

Even though speech was emerging, the other vocalizations, e.g. verbal-vocal play, verbal-vocal interaction, and proto-language, were also in use. However, in this stage, verbal expressions were more often used, and the proto-language was less frequently produced.

His verbal-vocal play was repetitively and continuously produced in the CV, \emptyset CV and C_1VC_2 structures. The C_1 and C_2 of utterances of the C_1VC_2 structure were still homorganic in articulation, or C_2 was a glottal stop. In addition to those which appeared in the vocal play in the previous stage, stops, and fricatives and nasals were also possible at C_1 and C_2 . The place of stops and fricatives remained labial, e.g. [-pap], [-pɔp], [-pɔp], [-faf], but for the nasals, there was contrast in place at C_1 and C_2 , e.g. [-ɲɛɲ]. (A syllable with the C_1VC_2 structure where C_1 and C_2 were labial-nasal occurred earlier in vocal play, and became one of the first words, i.e. [-mam] (baby talk for 'to eat') in the previous stage.) The number of syllables in a stretch of vocal play

(before a pause) ranged from 1 to as many as 7. Sometimes the vocal play appeared as a revision of sounds and pitches he had been exposed to; sometimes the vocal play was followed by immediate responses to familiar utterances produced by the adult. An example of the latter case was given in Appendix 2.13. In this example, P was 'reading' on his own. His mother was nearby listening without interrupting. After a while she made a comment and produced a familiar nursery rhyme, part of which P completed spontaneously and instantaneously.

It can be seen that in this example, the vocal play produced while P was 'reading' consisted of CV, ∂ CV, and CVC structures. Manner of articulation was restricted mainly to nasal; the rest varied among stop, affricate, semivowel and fricative, whereas the place was variable among labial, alveolar, palatal, velar and glottal. Familiar vowels appeared more often than the less familiar, i.e., front vowels more than back vowels. The pitch pattern within each stretch appeared repetitively. Again the familiar levels of pitch occurred more frequently than the less familiar, e.g. there were 37 mid, 31 low, 11 rising, and 5 falling. One consistent feature which also can be seen in this example is the association of low pitch with final glottal check.

The second part of this example shows that not only were the sounds the child had been exposed to recalled, but the whole unit of utterance in a certain context was also recognized. In this situation the mother picked up what she heard the child produce, i.e. [wəu wəu], which she recognized as part of the nursery rhyme the baby had been exposed to, and recited it, e.g. [-ka: /xi -ka:]. The child immediately completed the second part of the rhyme, e.g. [-wəu -wəu] - [-wai -wai] in the conventional system. However, when the mother

started a new rhyme which was unfamiliar to him he did not respond even though the articulations in the model were familiar to him.

Attempts at using newly acquired features within familiar syllables were also clearly seen in this stage. As mentioned earlier, rising pitch, backness and rounding had been acquired. In the present stage, P practised them by using these features in connection with basic syllables he already had in his repertoire, e.g. [pa] [ma] [wa] [da] [na] [ja] [dʒa] with mid or low tone. These syllables were also produced with a back rounded vowel and with the rising pitch, e.g. [mo:] [dʒa:]. Most utterances produced with the rising pitch at this stage were in a CV structure, and were meaningful. Therefore, rising pitch had become lexically contrastive, i.e. rising tone, and it was now in his basic system. The words produced by the child with the rising tone were firstly [mo:] 'doctor', [ma:] 'dog', [tʃa:] politeness particle. Within a short time more words with the rising tone were produced, e.g. [wa:n] 'sweet' - but used here for juice and his cousin's name.

His vocabulary was being built up. With help from repetitive interaction with the adults in routine situations, together with concrete visual aids - pictures and objects - new vocabulary came to be used functionally and consistently.

A list of the vocabulary the child had by this stage is given below:

<u>Words and baby talk</u>	<u>Meanings</u>	<u>Conventional forms</u>
[/ma: , ~ma:]	'dog, horse' (no distinction for the child)	[/ma:] 'dog' [~ma:] 'horse'
[_mam]	'to eat'	[_mam] (baby talk)
[_mɛ?, -a_mɛ?]	'mother'	[_mɛ:]

<u>Words and baby talk</u>	<u>Meanings</u>	<u>Conventional forms</u>
[_pɔʔ, _p ^h ɔʔ, _wɔʔ]	'father'	[\phɔ:]
[_mɔʔ]	'name of district	[\mɛ: ~mɔʔ]
[/mɔ:]	'doctor' (used by P as place where his mother works)	[/mɔ:]
[_pa:]	'fish'	[_pla:]
[/pɔ:, /pɔ:, /bɔ:] ^{*1}	'balloon'	[\lu:k _pɔ:ŋ]
[/pɔ:, /pu:] ^{*2}	'paternal grand- father'	[_pu:]
[_wua]	'cow'	[_wuə]
[_tɛ:, _tɛ:ʔ]	'glasses, doll'	[\wɛ:n-ta:] 'glasses' [_tuk -ta:] 'doll'
[_dʒua]	'pea-nut'	[_thuə]
[_dʒaʔ, -a_dʒaʔ]	'Uncle Sak' (a neighbour)	[_a: _sak]
[_ʔɔʔ]	'go out'	[_ʔɔ:k]
[_ja:, _ja:ʔ]	'maternal grand- mother'	[_ja:i]
[_ja:, _ja:ʔ]	'medicine'	[_ja:]
[_wɛi -wɛi]	'quick' (but 'crow' to P)	[_wai -wai]

Onomatopoeia, gestures

[_hɔ:~~]	onomatopoeia for the roars of a tiger
lying down	for 'rabbit' (based on a story of a rabbit and a tortoise)
spread arms	for 'a yacht' (based on the alphabet rhyme)
greeting ^{*3} (conventional way)	for 'monk' (based on the alphabet rhyme)

*1, 2 To be discussed later.

*3 By putting both hands together and bowing the head.

By this time, instrumental and informative functions were conveyed by the use of meaningful words and by the proto-language. In the proto-language, the informative signal was extended. Previously, the informative function was conveyed with front vowels on a high/high-rising pitch when the child wanted to inform about something 'un-usual', and a mid/lower-mid was used when he wanted to indicate the persons or objects he knew. In this stage, when the child wanted to inform of his achievement, front vowels were used on a high-falling pitch, e.g. | e: |, | ε: |, or | a: | with or without breathy

onset. For example, when he managed to open a baby-lotion container, or when he was asked to show a picture and he succeeded in doing so. Thus, high-falling pitch appeared to be used functionally in his proto-language.

Also in this stage, a certain kind of syllable, i.e. a nasal-breath syllable, [-ʔhmʔ], accompanied by glottal constriction, was used in a 'reading' situation, when the child had no intention of producing words in response to the adult models.

It seems that the pitch used in the proto-language had a link with the use of pitch contrastively at the lexical level. If a proto-tonal system of the proto-language in Stages V-VI was set up, it could be seen that mid/lower-mid, and high/high-rising proto-tones were used (in the proto-language, the contrasts of mid/lower-mid and of high/high-rising were not clear). These proto-tones later developed to be mid, low, and rising tones. In the present stage, high falling pitch appeared to be used in the proto-language as the informative function indicating 'success'. Thus another proto-tone, high-falling, was used.

If this is indeed the way tones develop, it should be possible to make a tentative prediction that it would not be long before the high-falling pitch would appear at the lexical level, since high-falling proto-tone had begun to be used functionally in the proto-language.

This prediction proves correct, since the child began to use high-falling pitch at the lexical level in Stage X (1;3.24-1;6.0) compared with this stage when he was (1;1.03-1;2.24).

With regard to the use of words in the instrumental function, there was evidence that the child made his own choice, constrained by the limitation of productive ability, in selecting words to convey his intention. From the previous stage, he produced a few words including 'baby talk' to indicate the instrumental function, e.g. [-mam] or [-mam -mam] for 'hunger', [-dua] for 'pea-nuts', [-wua] for 'picture book', and [-ʔʊʔ] for 'to go out'. From this stage onwards, more words were used within this function. What is interesting is the choice of words. He used the word [-pʊʔ] 'to peel' (adult form [-pʊ:k]) when he wanted an orange, [ʌsom]. Linguistically the word [-pʊ:k] 'to peel' collocates with the word [ʌsom] 'orange', and they always appeared to be used together before an orange was given to the child. The child must have been listening to this pair of words for a long time, and possibly was aware of the words as one unit.

What he chose to produce, i.e. [-pʊʔ], appears to be easier for him than [ʌsom], as far as his production ability is concerned.

[-pʊʔ] has features that are already well-established, e.g. plosive, labiality, backness, rounding, openness, and low tone (cf. pp. 135-137) [ʌsom], on the other hand, although it has some familiar features, has the unfamiliar feature of sibilance and falling tone. In addition,

at onset and ending there are too many contrasts for him to cope with, i.e. 'non-checked' onset/checked ending, oral/nasal, (his C_1VC_2 structure in this stage is only oral/oral or nasal/nasal e.g. [-pap] or [-mam]) and non-labial/labial (alveolar-labial). The word [-pɔʔ] was understood without any difficulty by the adults.

Relationship between the adult models and the child's responses

In interaction with adults, the production of a word in direct imitation, i.e. immediately after the model was produced, appeared to be very close to the model. Most of the vocabulary was produced by the child in a monosyllabic pattern, but occasionally there was a $\emptyset CV$ variant of the CV structure, e.g. [-a.mɛʔ], [-a.dʒaʔ] [-mɛʔ] [-dʒaʔ] for 'mother' and 'Sak'. The disyllabic words or compound words in the conventional system were responded to as monosyllables, and it was the second accented syllable of a disyllable or a compound which was consistently produced by the child. The child thus re-produced the syllable that was accented and more recent in the utterance, e.g. [-tɔ:] for [-wɛ:n-tɔ:] 'glasses' and [-tɔ:] for [-tʊk -tɔ:] 'doll'.

In this stage a few homonyms were used, e.g. [/pɔ:]^{*1} for [-lu:k -pɔ:] 'balloon' and for [-pu:] 'paternal grandfather,' [-tɔ:] for [-wɛ:n-tɔ:] and for [-tʊk -tɔ:] 'doll'; [-ja:]^{*2} for [-ja:i] 'maternal grandmother' and for [-ja:] 'medicine'.

Another characteristic of one word utterances produced by the child is that most words were produced in the form of open syllables, i.e. CV. However, final glottal check was always present when the low tone was produced. In addition, the child produced a glottal

*1, 2 See other variants in vocabulary list, pp. 141-142.

stop in correspondence to a final stop in the conventional form, e.g. [-pɔʔ] for [-pɔ:k] 'to peel', [-dʒaʔ] for [-sak] name of a neighbour, which was reasonably close to the adult form since final stops in Thai are unreleased and thus sound like weak glottal checks.

Most of the onsets of syllables produced by the child corresponded to those of the models provided that they were already acquired features, e.g. plosive, nasal, and semivowel at labial place, plosive at alveolar place, and affricate and semivowel at palatal place. For the unfamiliar manner, e.g. sibilance, an affricated onset was produced, e.g. [-dʒaʔ] for [-sak]. However, in eliciting the response, e.g. [-dʒaʔ] for [-sak],^t often affricated the sibilant [s], i.e. [ʔs]. This is probably a reason why the child produced an affricated form of the similar place, i.e. [dʒ-] for [ʔs].

Other features of consonant onsets, e.g. aspiration and consonant clusters, were not consistently produced. The child was using aspiration, but it was not yet in his basic system. Thus, sometimes this feature was produced as friction, other times as aspiration, and sometimes neither of these features was produced. Consonant clusters had not yet been acquired, therefore this feature was always omitted in the child's form.

Vowels were most often produced correctly (cf. vocabulary list, pp. 141-142).

With regard to the tonal system, only three tones were produced by the child, i.e. mid, low, rising.^{*1} Sometimes the low tone was produced as a variant of the mid tone. In such a case, the final glottal check was present and absent when the mid tone was used. Thus low, mid, and rising tones were mostly produced in regular

*1 Occasionally only the high component of the rising tone, which in this stage was produced as high-rising, appeared. The high tone itself had not yet been acquired in this stage.

correspondence to the models.

At this stage, the production of voiced and voiceless consonants was still not contrastive. Most often a voiced consonant was used as a variant of a voiceless consonant and vice versa, e.g.

[/po:] , [/bo:] for [\lu:k _po:ŋ] 'balloon'
 [/dʒa:] , [/tʃa:] for [/tʃa:] politeness particle

Communication in 'dialogue'

In 'dialogue', the child answered the adult's questions, and sometimes initiated the conversation himself. Most of the child's words, however, were recognizable as words of the adult language, i.e. they were close to the adult's words. Moreover, interaction in such situations provided evidence of the child's consistent use of his idiosyncratic forms. Examples of such use of words are given in Appendix 2.14(a), (b).

Some examples selected for their particular interest are discussed below.

One of the child's idiosyncratic forms is the word for [\lu:k _po:ŋ] 'balloon', for which he used [/po:] or [/pu:] or [/pɔ:] - sometimes voiced onset was used, e.g. [/bo:], [/bɔ:]. As far as the tone is concerned, it is surprising to see that for this word the child used the less familiar rising tone, instead of the more familiar low tone of the adult form, i.e. [_po:ŋ]. This word (reduced form) is in the form of labial plosive onset, backness, rounding, half-close degree of vowel opening, low tone, and nasal ending. The child produced it with his basic syllable structure, CV, labial plosive onset, backness and rounding, close to half-open degree

of vowel opening, no final nasal (which is probably not salient in the model), but used high-rising tone instead of low tone (low-falling) which was well established in his basic system. There was no evidence to explain why he did this, except that he created the word the way he wished. The adult in the situation was not sure whether the child meant 'balloon', until after checking by asking again and again what it was, to which P used the same form to refer to the same picture (cf. Appendix 2.14(a)). Eventually this form was accepted as the form for [-po:y] 'balloon' in the same way that [-mɛ?] was accepted as [mɛ:] 'mother'.

The child's persistence in using the word of his choice can also be seen in the use of the word [-pɔ?] 'to peel' for [sɔm] 'orange' when he asked for an orange in Appendix 2.14(b).

In dialogue, the use of tones at the lexico-semantic level was not an easy task for the child, especially with words similar in form, but different only in tone. Such words, e.g. [mɔ:] 'doctor', and [-mɔ?] ([-mɔ?] name of the Mae Moh district), were always produced interchangeably by the child. The adult did not correct this confusion because at least some features were produced correctly; for example, in the sample below, the adult did not correct the confusion made by the child, instead she repeated what would be well fitted into the context:

GM

| pui ju: thi: nai |
| ✓ - \ / |

P

| m:::mɔ::: ? |
| - / |

'Where does Pui live?'

(| mɔ? | is expected as an answer here)
| - |

GM

P

| ɔ: mɛ: mɔ? |
| ✓ \ |

'Yes, Mae Moh.'

| mɛ? ju thi: nai |
| \ / |

| mɛ: ? mɔ? |
| \ |

'Where is Mummy?' and

'Where does Mummy live?'

(mɔ: | is expected here as an answer)
| / |

| ɔ: ro:ŋ mɔ: |
| / \ / |

'Yes, at the clinic.'

Phonetic description of the tones produced by the child

As mentioned earlier, P had already acquired three tones: mid, low, and rising. The mid and low were distinguished by the mid and low pitch range as well as the presence of glottal stop with the low pitch and the absence of glottal stop with the mid pitch. The low tone was sometimes produced in such a low range of pitch that creaky sounds were also heard.

At this period, the rising tone was produced in two ways: firstly starting very high in the voice range, then rising abruptly even higher where it was sustained for a relatively long time. This was concomitant with glottal constriction and breathy release, e.g.

| ma:; ?h: |; secondly starting very high with an abrupt rise but without
| / |

sustained high, e.g. |ma:|. There was no glottal constriction and no breathy release in the latter.

In imitation, the rising tone was used, in one of the two ways mentioned above, but occasionally only the sustained high was used. It was noticeable that in producing words with rising or high tone, the adults always used a high pitch register which helped the child to perceive the pitch register contrast, i.e. high pitch register and normal pitch register. Such a contrast had been experienced by the child auditorily and articulatorily in the early stages, i.e. in his screeching and in his singing tune described on p. 57. As a consequence, in producing the rising tone the child also used the high pitch register.

In spontaneous production, the high-rising tone (hereafter the child's rising tone will be called 'high-rising tone'^{*1}) was also produced for words with high tone, e.g. [ma:] for [ma:] 'horse'. This is reasonable since the child had not yet had a contrast between the high tone and the high-rising tone. He had a combined form of the two tones, i.e. high-rise.

What is most interesting is the child's production in response to words with high-falling lexical tone. Such words, e.g. [pho:] 'father', [mɛ:] 'mother', [pa:] 'aunt', etc., were produced by P, both spontaneously and in imitation, using low tone (low-falling), e.g. [pʰɔ:ʔ]; [mɛʔ], [pa:ʔ] respectively.

The question arises at this point as to why the child does not produce a high-falling pitch where the model has high-falling pitch as was often produced in the early stages.

*1 The adult rising tone is phonetically low-rising.

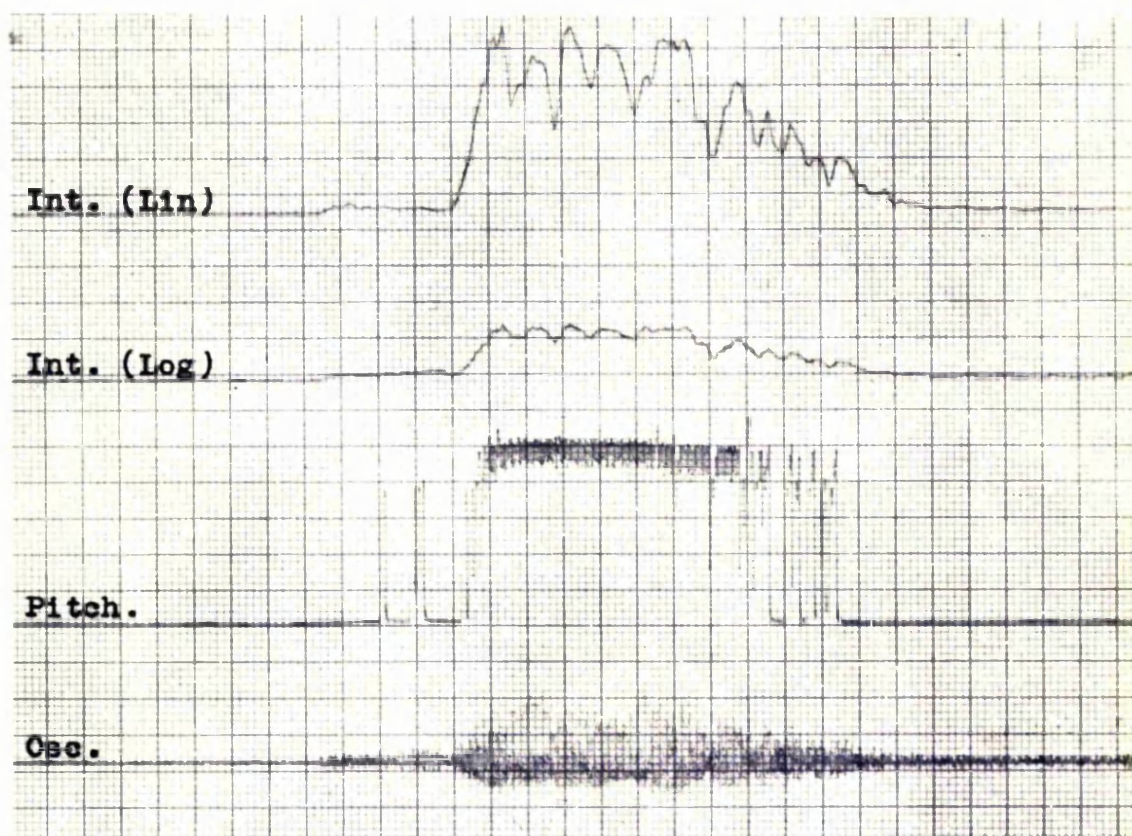
A tentative answer to this question, on the basis of what takes place in the course of acquisition, is attempted. The high-falling pitch in the early stages and in the later stages and in the present stage was used in a state of excitement and with loudness, and long vowel length or diphthongization, and because it was in a very loud and forceful breath-group, the fall was great. The high-falling pitch used in these situations did not function, as yet, at the lexical level. However, high falling pitch began to be used functionally, during this stage, in the proto-language with informative function (cf. p. 143).

At the lexical level, the child acquired only three tones: low (low falling), mid, and rising. There is no evidence that the high falling lexical tone had developed functionally in his linguistic system.

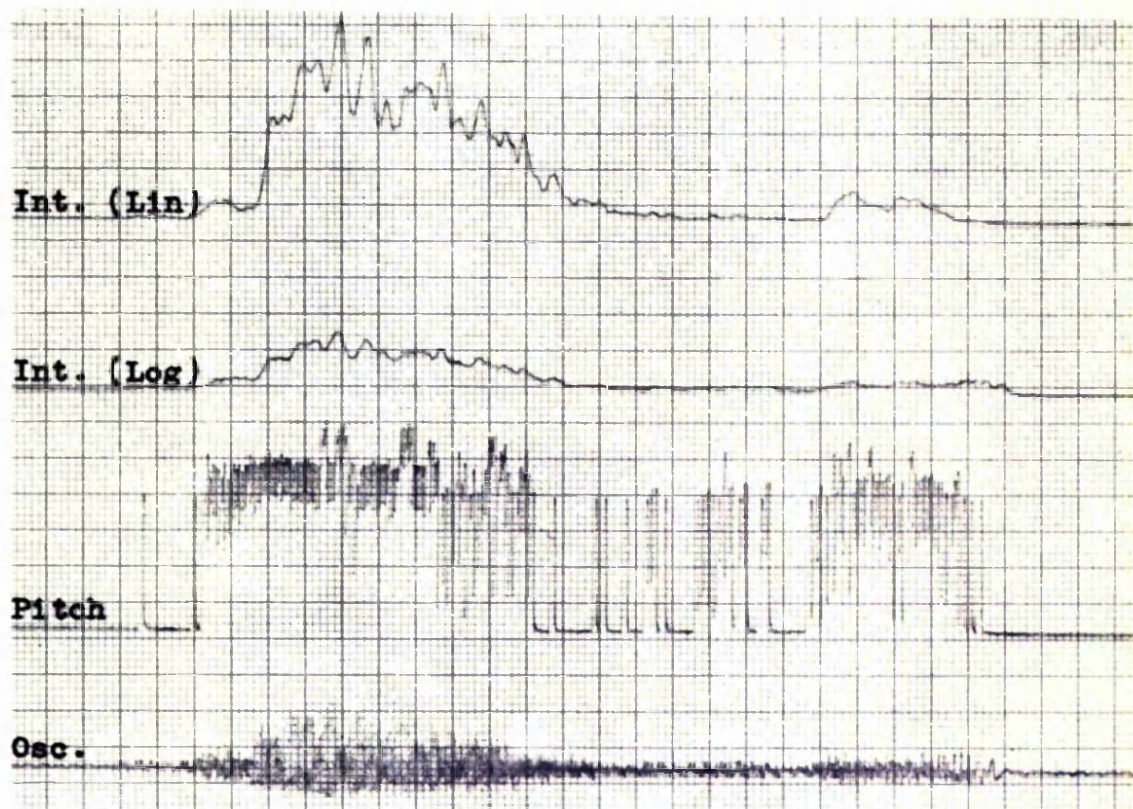
A further attempt to explain this phenomenon objectively was made. The pitch contours of high falling and low falling were compared by acoustic measurements. All the measurements were done by using the pitch meter and the mingograf.

The first measurement was from part of the data from the recordings. Two pitches produced by the child's father and the child himself were compared, i.e. the father's high falling, the child's low falling (cf. mingograms 1, 2). The mingogram of this pair was not ideally satisfactory because it was not possible to suppress the large amount of background noise present in that sample. However, it was seen that the pitch from the adult's and the child's utterances shared a final falling component.

For the same purpose, a live experiment was done on the same equipment (mingograf and pitch meter). First the writer imitated



1. [ʔɛ:] (Father's)



2. [-dʒə] (Baby's)

the words by the child's mother, i.e. [ʼmɛ:] and [ʼphɔ:], and imitated the responses produced by the child, i.e. [maʔ], [paʔ]. (Note that the experiment referred to the data from the earlier stage when aspiration and back rounded vowel had not been acquired by the child.) The comparison of the mingograms of the two pairs again showed that the two pitches had a similar shape. The differences of the two pitches were the high range for the high falling and lower range for the low (low falling) (cf. mingograms 3, 4).

These results suggest that the child may have paid most attention to the end part of the fall and produced that. Thus in the case of the two falling tones which have a shared component of fall to low pitch at the end, the child may have perceived, and hence produced both the same, so that he had only a low fall for both high fall and low fall.

In order to assess the likelihood of the above statement, another live experiment was done. This time the writer produced words in Thai with all five lexical tones. The words all had the same structure, CV̄, but different tones,^{*1} e.g.

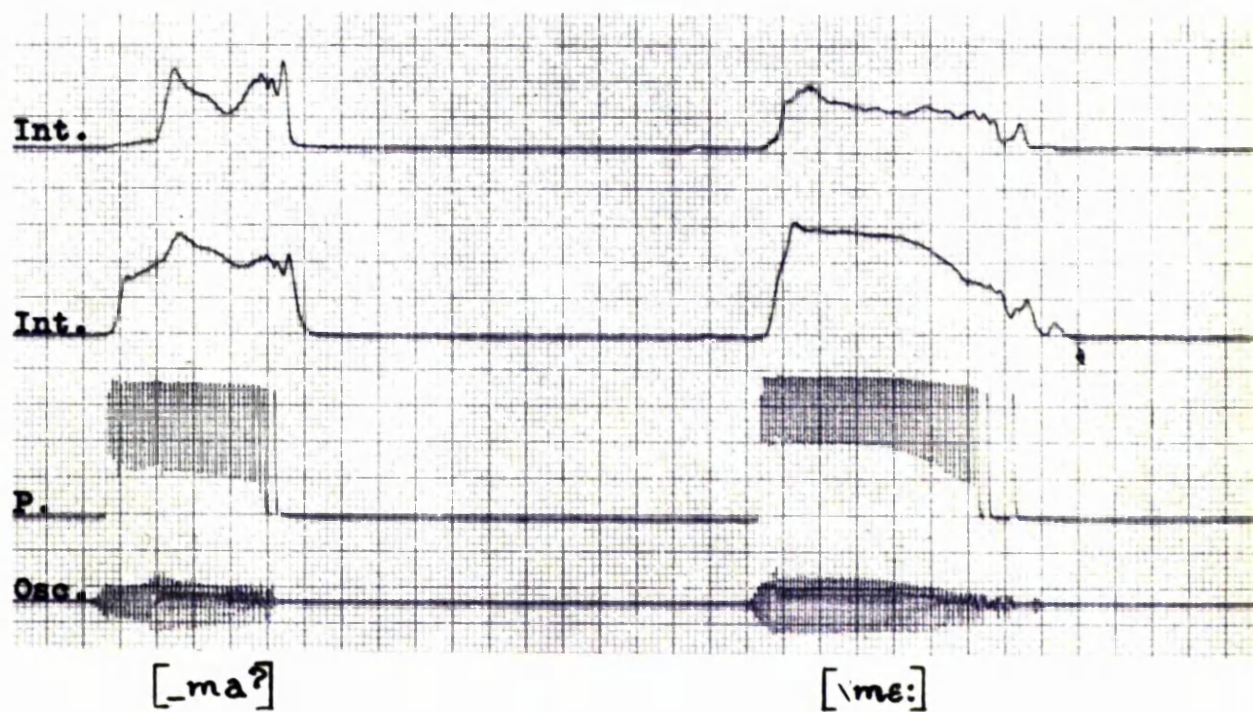
[-pa: _pa: \pa: ^pa: /pa:]

and

[-ʔa: _ʔa: \ʔa: ^ʔa: /ʔa:] (cf. mingograms 5, 5a, 6, 6a)

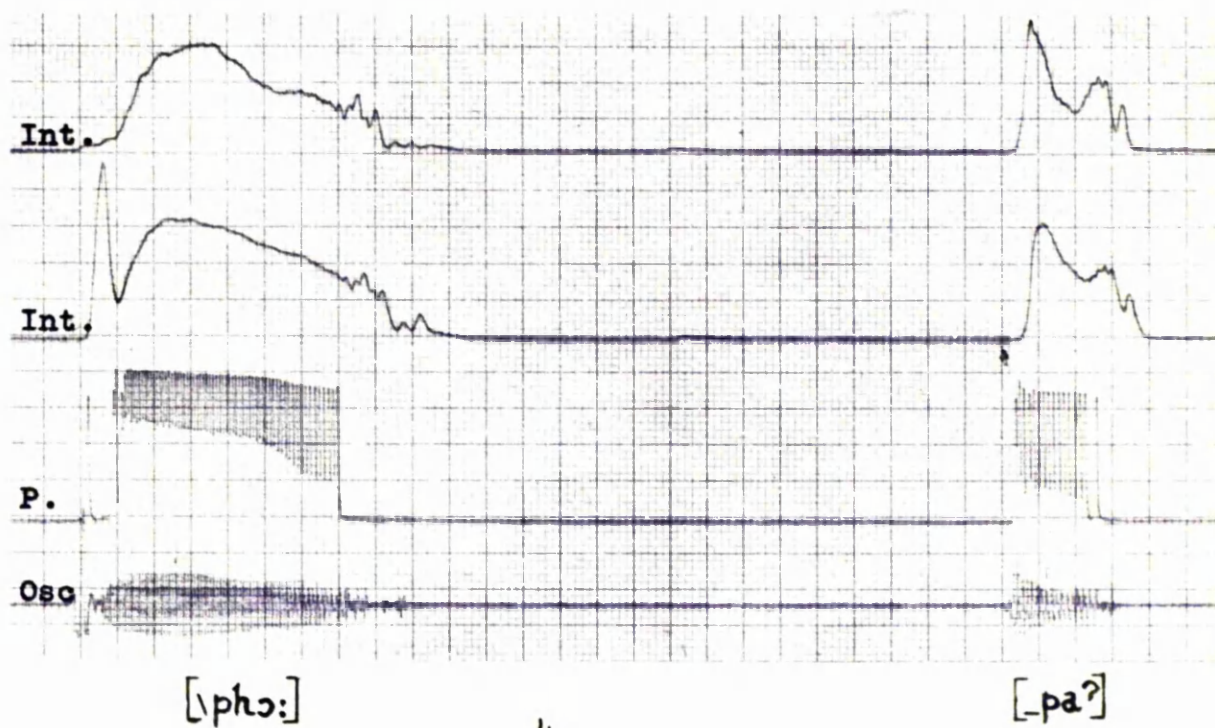
The results from the mingograms showed that the mid tone was fairly level without concomitant glottal constriction.

*1 Acoustic measurements of pitch contours of the five tones in Thai from a larger number of informants, whose age-group and pitch contours may be different from those of the subject of the experiments done in this study, have been reported by Abramson (1962) and Erickson (1974).

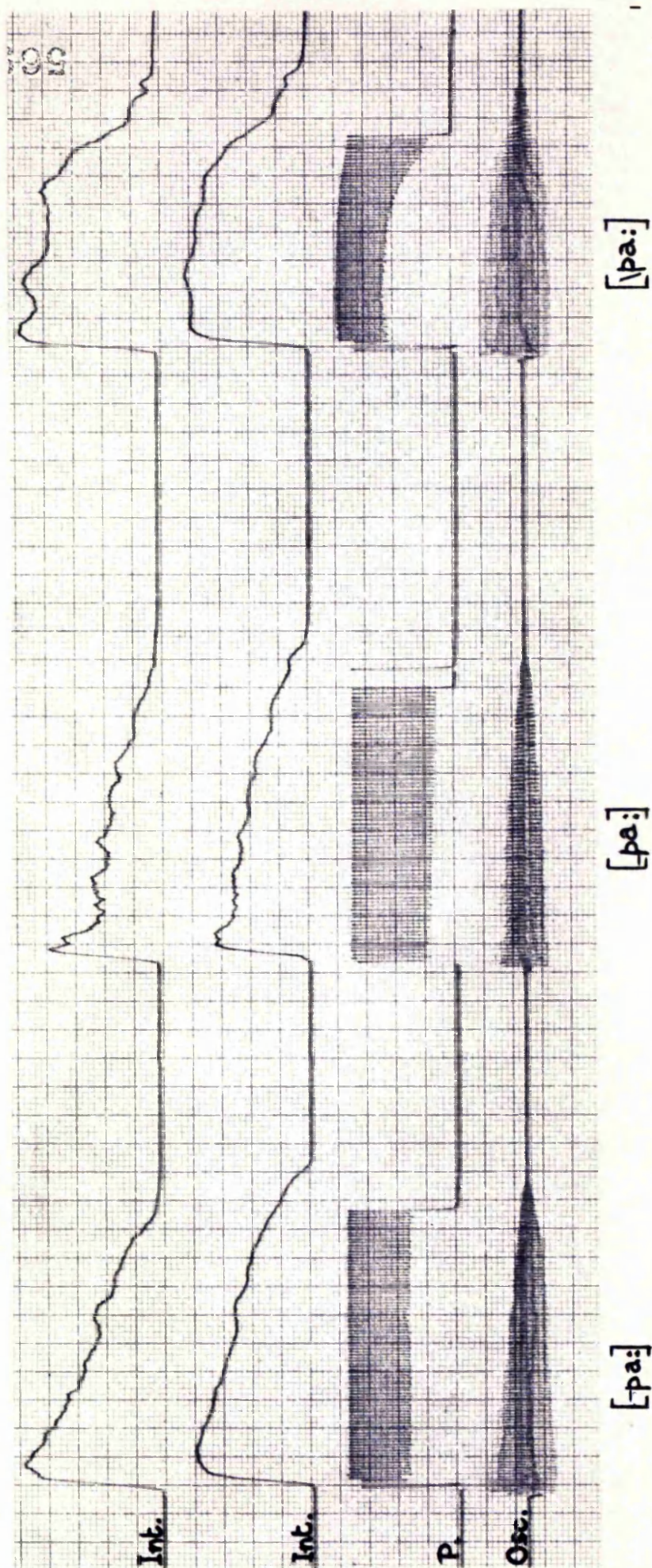


3.

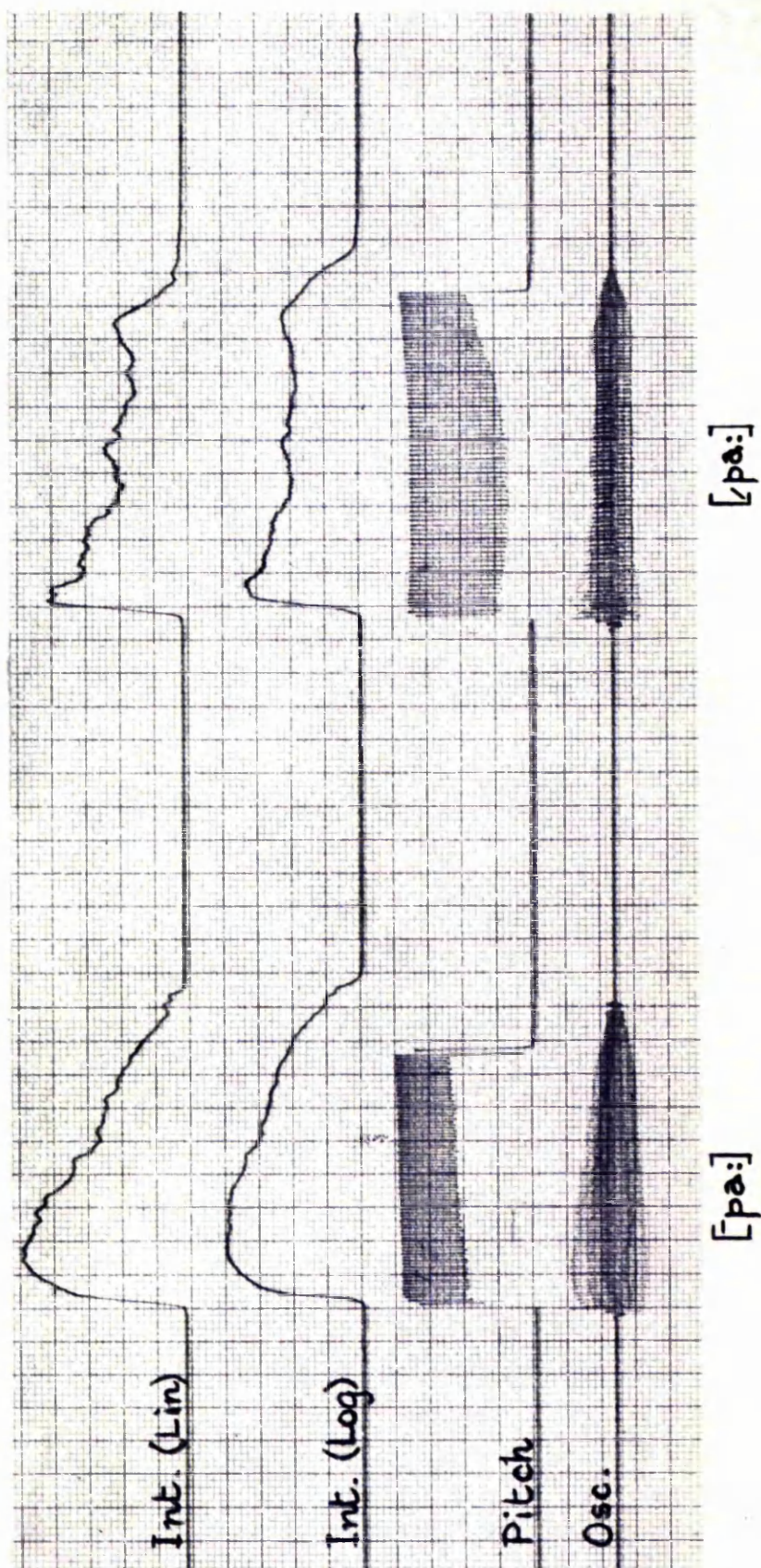
(The writer's reproduction of the baby's [-maʔ] & his mother's [me:])



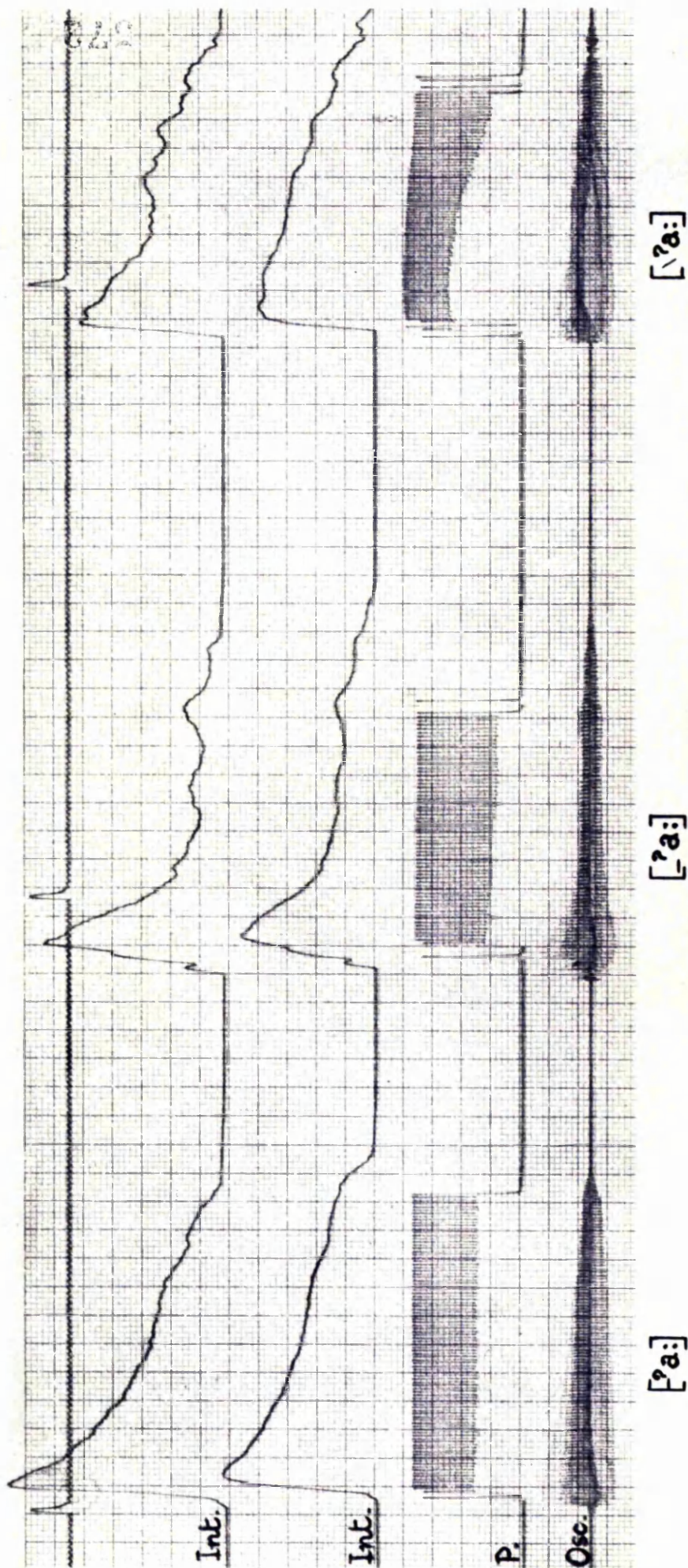
4.



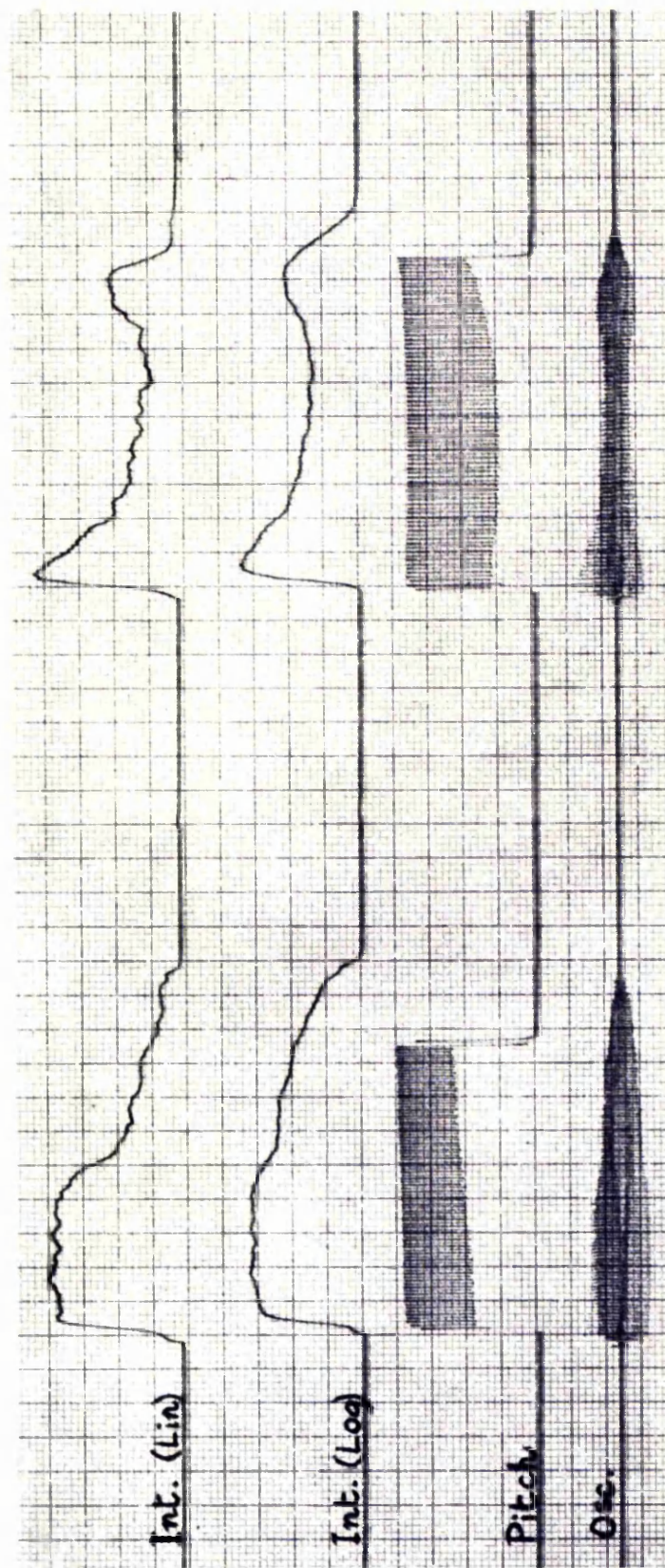
5.



5a.



6.



$[ʔa:]$

$[-ʔa:]$

6a.

The low tone (low-falling) had a gradual falling contour at the end, and was accompanied by final glottal check in both experiments.

The falling tone (high-falling) also had a falling contour. The presence of final glottal check appeared in one case, but was absent in the other.

The high tone had a gradual rising contour.

The rising tone (low-rising) had a curved rising contour.

The results, thus, support the probability of the statement made earlier that the child might have paid most attention to the end part of the contour of each tone, and produced that, i.e. he produced mid for mid, low-falling for low-falling and for high-falling which both share a falling contour. In the same way he produced high-rising for the high and rising tones which share a rising contour. The distinctions between high-falling and low-falling, and between high and rising appeared in Stage X. But such distinctions were not yet consistently made.

Phonological description of verbalizations in Stage VIII

As the child's vocalizations have become functional, and are now verbalizations, the term 'phonological' can be used in this stage. It can also be said that this is the stage when the basic phonological system was acquired. This is described below:

Description of basic phonology

Word structure.^{*1} The basic word structure consists of C and V

*1 Syllable structures which are not functional in the adult system, viz. V, ɔCCV, and which were in the child's peripheral system, are absent from the child's phonological system.

elements with a possibility of the occasional occurrence of \emptyset element, e.g. CV (\emptyset CV), CVC (\emptyset CVC). The CV and CVC structures are termed monosyllables, and \emptyset CV and \emptyset CVC are disyllables.

The monosyllabic structures CV and CVC may not be accented, but the first syllable, i.e. \emptyset , of the disyllabic structures, i.e. \emptyset CV, \emptyset CVC, is not accented.

Monosyllabic structures: CV, CVC. Prosodies of word structures, apart from 'tone^{*1} prosodies', are similar to those of the syllable structures mentioned in Stages VI and VII. Therefore, they will not be discussed again here.

Tone prosodies. There is a contrast of three tone prosodies:

- M (exponent: mid tone)
- L (exponent: low tone)
- R (exponent: rising tone)

V system. There is a contrast of [close] (close grade) and [open] (open grade), which function with the above-mentioned prosodies.

C system. The C-initial is restricted to P (Plosive), N (Nasal), [continuant] (Continuant) subsystems.

P subsystem. There is a four term contrast: p (labial), t (alveolar), c (palatal) and [glottal] .

N subsystem. There is one term: p (labial).

[continuant] subsystem. There is a two term contrast: p (labial), and c (palatal).

The contrasts of the subsystems of C-initial are shown in Table 1.

*1 As pitch is now functional, the term 'tone' is used.

Table 1. Comparison of contrasts at C-initial

P subsystem	p	t	c	ʔ
N subsystem	p			
ʔ subsystem	p		c	

Contrasts at C-initial in the basic phonological system do not differ from those in the last stage of pre-phonological system, i.e. Stage VII, but there are more contrasts at C in this stage than in Stage IV when the basic pre-phonological system was first set up.

The CVC word structure is restricted to C_1VC_2 where $C_1=C_2$ or where $C_2=P_?$. The C-final is restricted to P (Plosive) and N (Nasal) subsystems.

P subsystem. There is a two term contrast: p (labial) and ʔ (glottal).

N subsystem. There is only one term: p (labial).

The contrasts of the subsystems of C-final are shown in Table 2.

Table 2. Comparison of contrasts at C-final

P subsystem	p	ʔ
N subsystem	p	

Selected examples of monosyllables are given below:

<u>Formulae</u>	<u>Baby's Forms</u>	<u>Meanings</u>	<u>Adult Forms</u>
$P_p \propto^{y\bar{r}}$	M— [pa:]	'fish'	[- pla:]
$P_p \propto^{w\bar{r}} P_p$	L— [p ^h ?]	'daddy'	[\pho:]
$P_t \propto^{y\bar{r}}$	M— [t̥a:]	'doll'	[- tuk - ta:]
$N_p \propto^{y\bar{r}} P_p$	L— [mɛ?]	'mummy'	[\mɛ:]
$N_p \propto^{y\bar{r}}$	R— [ma:]	'dog'	[/ma:]
$\nabla_p l \propto^{w\bar{r}} \propto^{y\bar{r}}$	M— [wua]	'cow'	[- wuə]
$\nabla_c \propto^{y\bar{r}}$	M— [ja:]	'grandmother'	[- ja:i]

The disyllabic word structures, i.e. ∂CV and ∂CVC , occasionally occur as variants of the monosyllabic word structures. The systems and prosodies of the second syllables are similar to the monosyllabic word structures in every respect. The prosodies of the first syllable, i.e. ∂ , are described below.

∂ system. The ∂ system functions with the following prosodies:

y	(exponent: frontness)
<u>r</u>	(exponent: non-rounding)
M	(exponent: mid tone)

Examples of the disyllables are given below:

<u>Formulae</u>	<u>Baby's Forms</u>	<u>Meanings</u>	<u>Adult Forms</u>
$y\bar{r} \partial P_c \propto^{y\bar{r}} P_p$	M- L— [adza?]	Sak (name of a neighbour)	[- sak]
$y\bar{r} \partial N_p \propto^{y\bar{r}} P_p$	M-L— [amɛ?]	'mummy'	[\mɛ:]

Systems of peripheral word structure

As described before, structures in the peripheral system of vocalizations or verbalizations are those which appear in verbal-vocal play, or appear less frequently than those in the basic system. In this stage, in addition to systems and prosodies of those described in the basic word system, the C-initial subsumes N-subsystem with three contrasts: t (alveolar), c (palatal) and k (velar), e.g.

$N_t \propto \overset{M-}{\underset{L-}{VF}}$	-	$[\eta e]$
$N_c \propto \overset{M-}{\underset{L-}{VF}}$	-	$[\eta a:]$
$N_k \propto \overset{M-}{\underset{L-}{VF}}$	-	$[\eta a:]$

The F subsystem (which does not appear in the basic system) has one term, p (labial), e.g.

$F_p \propto \overset{L-}{\underset{L-}{VF}} P_p$	-	$[fa?]$
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The C-final includes P_p , P_p , N_t and F_p subsystems, e.g.

$P_p \overset{L-}{\underset{L-}{VF}} P_p$	-	$[pap]$
$P_p \overset{L-}{\underset{L-}{VF}} P_p$	-	$[p\alpha p]$
$N_c \overset{L-}{\underset{L-}{VF}} N_t$	-	$[\eta \epsilon \eta]$
$F_p \overset{L-}{\underset{L-}{VF}} P_p$	-	$[faf]$
$F_p \overset{L-}{\underset{L-}{VF}} P_p$	-	$[f\alpha?]$

The Θ prosody in the peripheral system functions also with \underline{y} , e.g.

$\overset{M-}{\underset{L-}{VF}} \Theta N_k \propto \overset{M-}{\underset{L-}{VF}}$	-	$[\dot{\epsilon} \eta \Theta]$
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Conclusions

When the basic and peripheral systems of vocalizations in Stage IV, and those in the one word utterance stage, i.e. Stage VIII, are compared it can be seen that some of what had come into use in the earlier stage continued to be used in the one word utterance stage. As far as the tones in the basic system are concerned, the tone system in Stage VIII is more advanced than the basic tone system in Stage VII. Again the basic pitch levels which occurred in Stage IV still occur at the present stage.

In comparison with the previous stage, Stage VII, it can be seen that new features were being built up on simple and familiar patterns which appeared in the previous stage. In this stage, language use is more advanced in that in speech, the child was capable of selecting words to convey his intentions and of creating words as he wished.

Stage IX (1;2.25-1;3.23)

General Phonetic Description

In this stage, the features which were practised and used in the previous stage were still in the process of being acquired, and became more refined. In spontaneous production, such features were more accurately articulated. The verbal-vocal play appeared consistently, but there was a gradual reduction in the use of proto-language. In the present stage, there was further progress in that frontness with close quality, i.e. [i] of the conventional quality, was acquired, and longer utterances were attempted. Thus there is progress in complexity of articulation.

In the same way as [o] [ɔ] [u] which were first practised in familiar word patterns, [i] appeared in familiar patterns, e.g. nasal + vowel: [mi:] 'bear'; plosive + vowel: [-pi:] or [-phi:] for [ʰphi:] 'elder sister'.

Longer utterances appeared in repeated form and were more complex in terms of articulation than those which appeared in the previous stage. In response to the conventional form, the correct number of syllables in the model was also attempted, e.g. the word [wi - tʰai] 'name of a neighbour', which was also used as the name of a place where the child could see fish [-pla:], and lotuses, [-bua], was produced by the child firstly as [-cʰe -cʰe -cʰe] or [-cʰɛ -cʰɛ -cʰɛ] or [-ʃɛ -ʃɛ -ʃɛ]; a few days later, he produced it as [tʰai tʰai], and eventually as [-tʰai -tʰai], which was a reduplicated form of the second syllable of the model, i.e. [tʰai]. In this case, the child produced and therefore most probably perceived the correct number of

syllables, affrication, front vowel with a glide from open to close position, and the tone. However, the labial and alveolo-palatal contrast of the word [wi -tɕhai] appears to have been too difficult for him at this stage. Thus, reduplication of the last syllable of the model was used.

In a spontaneous situation, longer utterances appeared to 'flow' out because the child needed to communicate and to express himself. This kind of longer utterance can be seen in the example below.

P and GM are talking about 'things' in the past.

GM

wan ni: pai ba:n luŋ wi-tɕhai luk hen arai
 | - - \ - - \ / - - |

'What did Baby see today at Uncle Wichai's

house?'

ɔ: hen pla:
 | \ / - |

'Oh yes, saw a fish'

pla: nai tsa? buə tɕhai mai luk
 | - - - - \ - \ |

'Was the fish in the lotus pond, Baby?'

P

pa: : : : : ?
 | - - - - - |

'fish'

tɕa?
 | - |

'pond'

(P goes on saying

ta ppu: ppu: wa?
 | - - - - |

'lotus pond'

ɔ: mi: ^tsaʔ buə | (laughs)
 - - - -

'Oh, I see, there was a lotus pond.'

lɛu kɔ mi: dɔ:k buə duəi ə lu:k
 \ - - - \ - -

'and there was a lotus as well?

khrai pha: lu:k pai
 - - \ -

cɸ[±] | cɸ^{±t} ʃʃ^{±t} | cɸ^{±t} cɸ^{±t}
 - - - -

'Who took Baby there?'

'Wichai'

ɔ: luywitɕhai
 \ - - -

'Yes, Uncle Wichai.'

The long utterance attempted by the child in the above example, i.e. [-tə-ɸɸu:-ɸɸu:-waʔ], was the only one in this stage which went some way beyond a repeated form.

Verbal-vocal play

The repetition in vocal play appeared more frequently in the form of the C₁VC₂ structure than in the CV structure. There was still harmony of place and manner of articulation of C₁ and C₂. In the previous stage there was only labial place for plosive and fricative, e.g. [-pɒp] [-pap] [-faf] [-βɔβ], and labial, alveolar, and palatal places for nasal, e.g. [-mam] [-ɲɛɲ], but in the present stage, harmony of place and manner at alveolar and palatal places for plosive also occurred, e.g. [-tət] [-tɛ^d], [-cɸ^c]. An example of vocal play in this stage is given in Appendix 2.15.

Some of the sounds produced in the vocal play appeared also in meaningful contexts. However, in the vocal play the number of syllables within a stretch of utterance was much greater than that of his production in conventional communication. Also the complexity of form and pattern in the vocal play was greater than that produced at the lexical level. It is probable that the longer utterances and greater complexity in vocal play prepare and lead the child to further complexity in form and pattern at the lexical level, and that the vocal play is instrumental in developing some skills the child will later apply to specific tasks (Keenan and Klein, 1974).

Compare the vocal play illustrated in Appendix 2.15 with the length of utterance and complexity in articulation in the child's communicative speech in the example below:

Feeding situation

GM

P

lu:k pai nai ma: luk
 \ - / - -

mmɛ?
 - -

'Where has Baby been today?'

'Mummy.'

pai ha: mɛ: ma: thi nai luk
 - / \ - \ / \

mɔ:?
 -

'Been to Mummy's. Where, Baby?'

'doctor' ('clinic' in this context)

pui tha:n kha:u kap arai
 \ - \ - -

hmpha: ʔh:
 \ -

'With what is Pui having rice?'

'vegetable'

tha:n kap phak lɛ:u arai ik a luk
 - - - - \

hp mu:??
 -

'With vegetable, and what else, Baby?'

'pork.'

Phonological description

The general phonological development in this stage is similar to that of the previous one. However, there is progress in that there is a new combination of syllable prosody with the close grade system of V, ι , i.e. y prosody, e.g.

$$P_p \iota^y - \left[\overset{L}{\text{pi:}} \right], \quad N_p \iota^y - \left[\overset{R}{\text{mi:}} \right]$$

Furthermore, the word structure CV is now reduplicated, i.e. (CV)². Thus the (CV)² structure can be added to the phonological system.

In the peripheral system, the C₁VC₂ structure where C₁=C₂, the P subsystem functions with two more contrasts, i.e. t (alveolar),

c (palatal), e.g. P _t VP _t	$\overset{L}{\text{[t\text{a}t]}}$
P _t VP _t	$\overset{L}{\text{[t\text{t}d]}}$
P _c VP _c	$\overset{L}{\text{[c]}\overset{c}{\text{t}}}$

Chapter 5

The Start of Two and Three Word Utterances

Stage X (1;3.24-1;6.0)

General Phonetic Description

In the last stage, in addition to one word utterances, the child also produced two and three word utterances in a spontaneous situation. These long utterances developed from familiar vocabulary in the form of repetition and combination of different words.

Verbal-vocal play still occurred in soliloquy. Words produced in such situations were those that had been used before in interaction. The proto-language was hardly used during this stage.

The progress in phonetic development was considerable. The rising tone, which had been produced as high-rising tone, now appeared to be closer to the quality of the rising tone in the conventional system, i.e. low-rising, and was produced with normal pitch register instead of high pitch register. The high-falling pitch which had been previously produced as low tone (low-falling tone), and which was used functionally in the last two stages in the proto-language, was now used functionally at the lexical level, i.e. (high) falling tone appeared with lexical words. However, it was inconsistently produced. That is to say words with the (high) falling tone, e.g. [ˈmɛ:] 'mother', [ˈfɑ:] 'father', [ˈfɑ:] 'cloth', were sometimes produced spontaneously with the correct quality of the tone of the conventional language, but other times they were produced with the low (falling) tone, or with the other acquired tones.

During this stage there were a few newly acquired words which were always produced with the correct quality of the high falling tone, e.g. [tə: ʌj a:] for [kə: ʌa:] 'Coca-cola', [ʌje:] for [bajle:] 'Birley's' (name of an orange drink), [duəi] for [duəi] 'together'. These words were acquired within this stage when the high-falling lexical tone began to be used. So as far as the falling tone is concerned, the child had no problem in producing these words with the falling tone.

High tone, which was formerly produced interchangeably with rising tone and also with low tone, sometimes appeared with the conventional quality, e.g. [phat] for [phat] 'to blow', [tɕhun] or [tɕhɔn] for [tɕhɔ:n] 'spoon', [tɕha?] for [tɕhak] 'to pull'. Therefore, up to this stage, all the five tones had appeared, but the tones used consistently were mid, low, and rising; falling and high tones appeared less consistently.

The consonants and vowels which appeared in his basic system are discussed below.

Consonants

Plosives. By this period, almost all plosives and affricates in the initial position of a syllable in the conventional system had appeared, e.g. [p-], [ph-], [t-], [th-], [k-], [kh-], [b-], [d-], [tɕ-], [tɕh-], but [kh-] and [k-] rarely occurred and most often [th-] and [t-] were used in place of [kh-] and [k-]. Voiceless and voiced contrast of [p/b], [t/d] was not yet consistently produced.

Nasals. In the initial position, nasals [m-], [n-] occurred. [ŋ-] did not yet occur as the velar closure in the child's system had not yet been fully developed.

Sibilant. The only sibilant in Thai, [s] was not as yet developed in the child's system. At this stage [dʒ-] or [tʃ-] or [th-] were used for conventional initial [s].

Fricatives. There are two fricatives in Thai: [f][h], but only [h] was produced by the child by this stage, e.g. [-h::] onomatopoeia for the roars of a tiger.

Semivowels. [w] and [j] were produced fluently in the initial position with the conventional quality, i.e. labio-velarized for [w], and with glottal constriction for [j]. In some cases, e.g. disyllables, [t] was used in place of adult [j]. (Harmony of consonants and tones of disyllables will be discussed later.)

Liquids [l][r]. The functional units of [l] and [r] were not yet developed in the child's system, but liquids were heard to be produced in the following ways:

[l] was produced as a glide onset, e.g. [l̥je:] for [-bai \ lei] 'Birley's'.

[r] was heard as an accompanying release of plosives in some words, e.g. [-a-drun] for [-a-dun] F's name, and in the vocal play, e.g. [-trɪt trɪt].

Otherwise [j] was used for the adult liquids [l r].

In the final position^{*1}, the following consonants occurred in the child's system:

Stops. (These are unexploded in final position.) [p] and [t] occurred, and sometimes alternated with [ʔ]. [k] rarely occurred, and [ʔ] was usually used instead. Thus, overall [ʔ] was produced the most frequently.

*1 In Thai, only [p, t, k, m, n, ŋ] occur finally, and the voiced and voiceless contrast for [p, t, k] in this position is not functionally significant, and is not clearly produced.

Nasals. [m] [n] occurred frequently and fluently; [ŋ] rarely occurred.

In the final position, the glottal stop, [ʔ], played an important role as a functional unit, and for this child, the use of the glottal stop in place of other stops in the final position is articulatorily reasonable. In Thai, as pointed out by Henderson (1964), the oral closure for the stop in the final position is accompanied by simultaneous glottal closure. The child at this stage was not fully capable of making oral closure at the same time as the glottal closure was being made, especially not in cases where the closures were close to each other, e.g. velar, glottal. Thus, only one closure which would retain the unexploded quality of the stop was made, i.e. glottal closure.

Clusters. None of the [khr-, khl-, kr-, kl-, tr-, phr-, pr-, phl-, pl-, kw-, khw-] initial clusters of the adult language was found in the child's speech.

Thus, by 18 months, the following word structures occur: CV, CVC, əCV, and əCVC. The frequency of occurrence of CV in meaningful speech was higher than of the rest. The əCV and əCVC structures, which are not in the adult phonological system, occurred only as variants of CV and CVC structures, e.g. [-a tɔʔ] for [tɔʔ] 'table', [-a tɕhɔ:n] for [tɕhɔ:n] 'spoon', and [-a phɔ:n] for [phɔ:n] 'Pom', [-a tɕi] for [tɕi] 'M's pet name'. This is probably because the child needed an open onset as preparation before a closure was made.

With regard to the CVC structure, it appears that the child produced words of the C_1VC_2 structure with minimal contrasts, i.e. two possibilities of the co-occurrence of C_1 and C_2 are 'checked-checked', e.g. [- pit] [- phat] and 'non-checked-checked', e.g. [- jot], [- jen]. 'Checked' is plosives (stops for the final position), affricates, or

nasals. 'Non-checked' is semivowels, or fricatives.

In this stage, the use of the C_1VC_2 structure at the lexical level was produced with or without place differentiation.

Without place differentiation. The possibilities of this kind of syllable are as follows:

1. Labial-Labial, e.g. [-mam] 'to eat'
2. Alveolar-Alveolar, e.g. [-tat] 'to cut', [-dun] 'F's name'
[-nɔ:n] 'to sleep'

With place differentiation. The possibilities are greater, e.g.

1. Labial-Alveolar, e.g. [-phat] 'to blow', [mɔ:n] 'pillow',
[-bin] 'to fly'
2. Palatal-Alveolar, e.g. [-jen] 'cool', [-jot] for [-rot] 'vehicle', [tɕhin] 'piece'...
3. Alveolar-Velar, e.g. [-tak] 'to spoon, to dip up'
4. Palatal-Velar, e.g. [-joŋ] 'down', [tɕhak] 'to pull'.

Vowels

All front vowels of the adult system, i.e. [i e ɛ a] occurred. The vowel length contrast was not yet consistent. The child sometimes produced a word with a short vowel as a variant of that with long vowel or vice versa, but most often the vowel of the \overline{CV}^{*1} pattern retained the long quality.

In most syllables, the contrast between [i] and [a] was clear whereas the contrast between [e] and [ɛ] was less distinct. In the same way all back vowels of the adult language occurred, but the degrees of openness and rounding were not clearly produced, i.e. [u⁺]

*1 There was only one exception: the word [-mɛʔ], his early form for 'mother', was still in use, as well as the correct form [mɛ:].

[⁰][⁵] were sometimes used interchangeably, e.g. [⁻tɕhɔ:n] 'spoon' was variably produced as [⁻tɕhun]. In other words, the rounding feature was produced in accordance to the adult model, but the degree of openness may be variable.

The backness and nonrounding of vowels, [⁺u⁺ ɤ⁺], also appeared, but occurred less frequently than backness and rounding. [⁺ɤ⁺] was used varying in form with [ə]. [⁺u⁺] rarely occurred. Interestingly enough, [⁺u⁺] quality appeared frequently in the early stages, but rarely occurred at the lexical level in this stage.

The possibilities of vowel glides used at the lexical level are as follows:

1. Open-close: [ai] or [əi] and [au], e.g.

[⁻ wai]	'to keep', or 'to put on surface'
[⁻ wəi]	'quick', used in nursery rhymes
[⁻ ʔau]	'want'
2. Close-open: [ua] or [uɛ] [uə], e.g.

[⁻ wua]	'cow'
[⁻ bua]	'lotus'
3. Close-open-close: [uəi], e.g.

[⁻ duəi]	'together', 'as well'
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Tones

By this stage all the five tones of the conventional system had been acquired, but the high tone and falling tone were not consistently produced. Sometimes the low tone was used in place of the falling tone, and the low or rising tone was used in place of the high tone.

The reason why the child used the low tone and rising tone as variants of the falling and high tones have been discussed before

(cf. pp.150-158) on the basis of phonetic evidence and of the order of language acquisition. Now, there is further evidence that the child never applied a tone within an inadmissible structure, e.g. he never used the rising tone to replace the high tone when the syllable structure was C_1VC_2 , where C_2 = stop, which is not possible in the conventional system. The child would use the other tones which are admissible in such a structure. The child's linguistic system is, thus, constrained by the phonological rules of the language he is learning.

The examples of the use of tones are shown below in comparison with the admissible tones in the adult system.

The summary of the phonological rules of the tones in Thai is shown below: (\bar{V} = long vowel, \check{V} = short vowel)

$C\bar{V}$		5 tones	: low, mid, high, falling, rising
$C\check{V}C_N$	(N=nasals)	5 tones	: low, mid, high, falling, rising
$C\check{V}C_S$	(S=stops: p t k ?)	2 tones	: low, high
$C\bar{V}C_S$	(S=stops: p t k ?)	2 tones	: low, falling

As far as the tones and the structures are concerned, what the child used was phonologically acceptable, e.g.

- $[-m\epsilon?] \text{ for } [\backslash m\epsilon:] - C\check{V}C_S \text{ for } C\bar{V} \text{ (} C\check{V}C_S \text{ low tone possible)}$
- $[-pho:]? \text{ for } [\backslash pho:] - C\bar{V}C_S \text{ for } C\bar{V} \text{ (} C\bar{V}C_S \text{ low tone possible)}$
- $[-to?] \text{ for } [\backslash to?] - C\check{V}C_S \text{ for } C\check{V}C_S \text{ (} C\check{V}C_S \text{ low tone possible)}$
- $[/tho:] \text{ for } [/so:] - C\bar{V} \text{ for } C\check{V}C_N \text{ (} C\bar{V} \text{ 5 tones possible)}$

Long utterances

As mentioned earlier, long utterances developed from familiar vocabulary in the form of repetition and combination of differentiated words. The examples of these long utterances are as follows:

1. Reduplicated form. These reduplicated forms are in CV or CVC structures. The CVC structure consists of those with harmony in place and in manner, e.g. [-tət]; those with harmony in place but differentiation in manner, e.g. [-dun]; and those with differentiation in place and manner, e.g. [-phan]. For example:

[-dun -dun]	P's name	reduplication of the last syllable of [-a-dun]
[-ja:i -ja:i]	'grandmother'	reduplication of the word [-ja:i]
[-tɕɔ:n -tɕɔ:n]	'spoon'	reduplication of the word [-tɕhɔ:n]
[-təʔ -təʔ]	'to spoon'	reduplication of the word [-tak]
[-tət -tət]	'to cut'	reduplication of the word [-tat] (means 'banana' in the context)
[-phan -phan]	Porn	reduplication of the word [-phɔ:n]

2. Combination of differentiated forms. Two or more different words are combined resulting in both a conventional utterance and a telegraphic utterance. An asterisk is used to show telegraphic utterances, e.g.

<u>P's utterances</u>	<u>Meanings</u>	<u>Adult's full forms</u>
*[-wai -təʔ]	'put on/table'	[-wai -bon -təʔ]
[-tu: -piɛʔ]	'polish/wet'	[-tu: -piək]
*[-nai -jen]	'in/fridge'	[-nai -tu: -jen]
[-pɔʔ -piɛʔ]	'peel/skin'	[-pɔ:k -pluək]
[-tha: -pen]	'eat/-able (able to eat)	[-tha:n -pen]

<u>P's utterances</u>	<u>Meanings</u>	<u>Adult's full forms</u>
* [tʰɕhɔ:n -ja: -taʔ]	'spoon/grandma/to spoon'	[-ja:i /khɔ: -tʰɕhɔ:n -ma: -tak]
	('May I have a spoon')	
[-au -tʰɕhɔ:n -tak]	'want/spoon/to spoon'	[-au -tʰɕhɔ:n -tak]
* [ʋmɛ: -tʰɕhit -tʃa:]	'Mummy/give/injection'	[ʋmɛ: -pai -tʰɕhi:t -ja:]

3. Utterances with a combination of reduplicated and differentiated words. In this case, the length of utterances in a spontaneous situation increases.

Situation I. (Interactions are given in detail in Appendix 2.16)

[-t ^h a: -tat -tat]	'(I) want to have a banana'
[-taʔ -taʔ -au -tʰɕhɔ:n -tak]	'(I) want a spoon' (for the banana)
[-mam -phɔa -mam -mam]	'Daddy (I) give you some to eat'
[-mam -mam -phi: -mam]	'Sister ^{*1} (I) give you some to eat'

Situation II. P was cycling.

[-tʰɕhun -tʰɕhun -phan -phan]	'(I) am going to hit Porm'
[/khen -dun, -dun,]	'Push, Daddy Daddy'

There is evidence that utterances consisting of polysyllabic words were produced with harmony in tone and in place and manner of articulation, e.g.,

<u>Adult forms</u>	<u>P's forms</u>	<u>Meanings</u>
(1) [-nai -tu: -jen]	[-nai -tu -ten] or [-tai -tu -ten]	'in the refrigerator'
(2) [-ma -la -kɔ:]	[-tɔ: -tɔ:] or [-ʔɔ: -tɔ:]	'papaya'
(3) [-tuk -kɛ:]	[-tu -tɛ:] or [-ʔu -tɛ:]	'big lizard'

*1 'Sister' is also used by those younger when addressing their elders (female). In this case P addressed his older friend.

From the examples above it is seen that the production of polysyllables is similar to that of the C_1VC_2 monosyllables, i.e. with harmony first, and with differentiation later on. It appears that what remains most consistently and correctly produced is the vowel quality, whereas the tones and the consonants are harmonized. This is, however, explicable.

In (1), mid tone and alveolar place were used in the child's spontaneous utterance since they were well established in the child's linguistic system. In this case, the falling tone was not produced because it was not, by this time, consistent in his speech.

In (2), the reduplicated form of the last syllable of the adult model was reproduced and as [k] was not consistent in the child's system [t] was therefore used. The reason why the child did not reproduce the first two syllables was because the last syllable of this word, i.e. [-kɔ:] is accented, whereas the first two are not. Also, the articulation of the unaccented syllables was so quick that the two syllables sounded as if they were one syllable, i.e. [-m₁-la]. This is, of course, like a [ml-] cluster, and undoubtedly was ignored by the child.

In (3), the high tone was not consistently produced, so the high tone of the first syllable was ignored, and [t] was used for [k].

Interestingly enough, in producing two or more monosyllabic words in a sequence, in spite of differentiation of the words, harmonization in place/manner of articulation and in tone does not occur, e.g.

[/thu: _piək]	[/thu: _piɛ?]	'polish/wet'
[-pɔ:k _pluək]	[-pɔ? _piɛ?]	'peel/skin'
[-au _muək]	[-au _muə?]	'want/hat'
[-au ˈtʃɔ:n _tak]	[-au ˈtʃɔ:n _tak]	'want/spoon/to spoon'
[-au ˈtʃɔ:n _tak]	[-au ˈtʃɔ:n _tak]	'want/spoon/to spoon'

<u>Adult models</u>	<u>P's forms</u>	<u>Meanings</u>
[tʃhak \wa:u]	[tʃha? \wa:u]	'fly/kite'
[bi? tʃhin]	[bi? tʃhin]	'break/piece'
[khi: rot]	[khi: jot]	'ride/vehicle'

This could be because they are familiar as individual units whereas words of more than one syllable are only being newly acquired, and each word in the model has greater internal complexity which has to be handled somehow.

Verbal-vocal play

In soliloquy, there is evidence showing a similar phenomenon to that reported by Weir (Weir, 1962), that the utterances were similar to pattern drills. The child in the present study produced one word, repeated it, and then produced another word; next he put two words together with a different sequence of word order.

Two examples of verbal-vocal play are given in Appendix 2.17. In the first example, the child produced a series of two words [-pho:] [-mi?] 'Daddy, Mummy' continuously in the way described above. In the other example the child produced words, names of people, onomatopoeic forms, and babbling. These words had been used or mentioned to him before in interaction.

Phonological description of verbalizations in Stage X

In this stage, the phonological system of the child's verbalizations is very close to the conventional system (cf. the outline of the adult phonological system, pp. 14-18).

The basic word structures are of two types: monosyllables, CV, CVC and disyllables əCV, əCVC. The disyllables occur occasionally as variants of monosyllables. The prosodies of the first syllable, i.e. ə, are similar to those described in Stage VIII. The systems and prosodies of the second syllable are the same as those of the monosyllables, therefore only the systems and prosodies of the monosyllable are to be described in this stage.

Phonological structure of monosyllables CV and CVC

Elements of structure are C and V systems and prosodies of the syllable.

The prosodies of the syllable are as follows:

y	(exponent: frontness)
<u>y</u>	(exponent: centrality)
w	(exponent: backness)
r	(exponent: rounding)
<u>r</u>	(exponent: non-rounding)
h	(exponent: breathy syllable initial with late onset of voice)
<u>h</u>	(exponent: non-breathy syllable initial with early onset of voice)

Tone prosodies. There is a contrast of five tone prosodies, i.e.

L	(exponent: low tone), e.g. ^{L—} [bi?] 'break into pieces'
M	(exponent: mid tone), e.g. ^{M—} [nɔ:n] 'to sleep'
H	(exponent: high tone), e.g. ^{H—} [tʃhak] 'to pull (hard)'
F	(exponent: falling tone), e.g. ^{F—} [pha:] 'cloth'
R	(exponent: rising tone), e.g. ^{R—} [mun] 'to turn round'

As in the adult system, the occurrence of tone prosodies is phonologically constrained by word structure and vowel length, \bar{V} = short vowel, $\bar{\bar{V}}$ = long vowel.

The $C\bar{V}$ and $C_1\bar{V}C_2$ (where C_2 = nasal) occur with five tone prosodies, but C_1VC_2 (where C_2 = stop) occurs with L, H and F prosodies. At this stage, however, F and H prosodies function inconsistently.

V system. There is a contrast of l (close grade) and α (open grade) which function with the various syllable prosodies.

l (close grade), e.g. [i ɛ e ʊ ʉ ɔ̃ ɔ̃̃]

α (open grade), e.g. [ɛ a ə ɔ̃]

Within a syllable, there are possibilities of the co-occurrence of l and α , e.g. $\alpha-l$, $l-\alpha$, and $l\alpha-l$; and of no contrast, e.g. $l-l$ and $\alpha-\alpha$. These also function with the syllable prosodies, e.g.

I Contrast of α and l ^{*1}

(1) $\alpha-l$ (open-close), e.g.

<u>Formulae</u>	<u>Child's forms</u>	<u>Meanings</u>	<u>Adult forms</u>
$C\bar{V}_{\alpha-l}^{yr}$	M— [wai]	'to put on surface, to keep'	[wai]
$C\bar{V}_{\alpha-l}^{yr} - \bar{V}_{\alpha-l}^{yr}$	M— [wəi]	'quick'	[wəi]
$C\bar{V}_{\alpha-l}^{yr} - \bar{V}_{\alpha-l}^{wr}$	M— [wəi] [ʔau]	'want'	[ʔau]

(2) $l-\alpha$ (close-open), e.g.

$C\bar{V}_{l-\alpha}^{wr} - \bar{V}_{l-\alpha}^{yr}$	M— [wua]	'cow'	[wuə]
	M— [bua]	'lotus'	[buə]

*1 In other words, diphthongs and triphthongs in the conventional system.

(3) ɿ-ɿ-ɿ (close-open-close), e.g.

<u>Formulae</u>	<u>Child's forms</u>	<u>Meanings</u>	<u>Adult forms</u>
CV ^{WR} _{ɿ-ɿ-ɿ}	F — [duəɪ]	'together, also'	[ɿduəɪ]

II No contrast *1

(1) ɿ-ɿ (open-open), e.g.

CV ^{VF} _{ɿ-ɿ}	R — [ma:]	'dog'	[/ma:]
CV ^{VF} _{ɿ-ɿ} C	R — [wa:n]	'sweet'	[/wa:n]

(2) ɿ-ɿ (close-close), e.g.

CV ^{WR} _{ɿ-ɿ}	R — [mu:]	'pork, pig'	[/mu:]
CV ^{WR} _{ɿ-ɿ}	L — [pɿ:t]	'open'	[_pɿ:t]

C system

The C-initial system is restricted to P (Plosive), F (Fricative), N (Nasal), and ʋ (Continuant) subsystems.

P subsystem. There is a five term contrast, p (labial), t (alveolar), c (palatal), k (velar), and ʔ (glottal), e.g.

P _p ^V	R — [pau]	F's pet name	[/pau]
P _t ^{VC}	L — [tɔʔ]	'table'	[_tɔʔ]
P _c ^{VC}	H — [tɕhin]	'piece'	[_tɕhin]
P _k ^{VC}	R — [khen]	'push'	[/khen]
P _ʔ ^{VC}	L — [ʔɔʔ]	'out'	[_ʔɔ:k]

N subsystem. There is a two term contrast: p (labial) and t (alveolar), e.g.

*1 In other words, long vowels in the conventional system.

<u>Formulae</u>	<u>Child's forms</u>	<u>Meanings</u>	<u>Adult forms</u>
$N_p V$	$\begin{array}{c} F \text{ ---} \\ [m\epsilon:] \end{array}$	'Mummy'	$[\backslash m\epsilon:]$
$N_p VC$	$\begin{array}{c} R \text{ ---} \\ [mun] \end{array}$	'turn round'	$[/mun]$
$N_t VC$	$\begin{array}{c} M \text{ ---} \\ [n\upsilon:n] \end{array}$	'sleep'	$[-n\upsilon:n]$

F subsystem. There is only one term: ? (glottal), e.g.

$F_p V$	$\begin{array}{c} L \text{ ---} \\ [h\upsilon:] \end{array}$	roars of tiger (onomatopoeia)
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ɸ subsystem. There is a two term contrast: p (labial) and c (palatal), e.g.

$\mathcal{P}_p VC$	$\begin{array}{c} R \text{ ---} \\ [wa:n] \end{array}$	'sweet'	$[/wa:n]$
$\mathcal{P}_c VC$	$\begin{array}{c} M \text{ ---} \\ [jen] \end{array}$	'cold'	$[-jen]$

The contrasts of C-initial are shown in Table 1.

Table 1. Contrasts of C-initial

P subsystem	p	t	c	(k) ^{*1}	?
N subsystem	p	t			
F subsystem					(?)
ɸ subsystem	p		c		

The C-final system is restricted to P (Plosive), and N (Nasal) subsystems.

P subsystem. There is a four term contrast: p (labial), t (alveolar), k (velar), and ? (glottal), e.g.

*1 Bracketed symbols show that such contrasts occur less frequently than the others in the same subsystem.

<u>Formulae</u>	<u>Child's forms</u>	<u>Meanings</u>	<u>Adult forms</u>
CVP_p	L— [pɔp]	sound of hammering (onomatopoeia)	
CVP_t	H— [phat]	'to blow' (wind)	[ˈphat]
CVP_k	H— [tʃhak]	'to pull' (hard)	[ˈtʃhak]
$CVP_?$	L— [bi?]	'break into pieces'	[ˈbi?]

N subsystem. There is a three term contrast: p (labial), t (alveolar), and k (velar), e.g.

CVN_p	L— [mam]	'to eat' (baby talk)	[ˌmam]
CVN_t	R— [mɔ:n]	'pillow'	[ˌmɔ:n]
CVN_k	M— [ˈɔŋ]	'to come (go) down'	[ˌlɔŋ]

The contrasts of C-final are shown in Table 2.

Table 2. Contrasts of C-final

P subsystem	p	t	(k)	?
N subsystem	p	t	(k)	

Selected examples of monosyllables with possible prosodies and contrasts are shown below:

$hyP_p \propto P_t$	H— [phat]	'to blow' (wind)	[ˈphat]
$hyP_c \propto N_t$	M— [jen]	'cold'	[ˈjen]
$hyP_t \propto P_t$	L— [tət]	'to cut'	[ˈtat]

<u>Formulae</u>	<u>Child's forms</u>	<u>Meanings</u>	<u>Adult forms</u>
$hwr_{P_t} l-l$	$\begin{matrix} R- \\ [thu:] \end{matrix}$	'to polish'	$[/thu:]$
$hwr_{P_t} l N_t$	$\begin{matrix} M- \\ [dun] \end{matrix}$	second syllable of F's name	$[-dun]$

The phonological description of long utterances, which are the consequence of reduplication of monosyllables, i.e. $(CV)^2$ or $(CVC)^2$ or combination of monosyllables $(CV+CV)$, $(CV+CVC)$ or $(CVC+CV)$, is similar to the description of monosyllables described above.

The description of pre-phonological and phonological development of the child under study shows clearly how the pre-phonological system merges into the phonological. A gradual transition, therefore, is seen.

Conclusions

It can be seen that most of the features which characterize the Thai language have been acquired; these are syllable structures, tones, consonants, vowels, aspiration, unexploded final stops, and length. Among the consonants, stops, nasals, and semivowels are consistent, but liquids and initial clusters have not yet been acquired. In the same way, vowels are consistently produced, but some of the functional diphthong glides have not yet appeared (only $[ai \ au \ ua \ i\epsilon \ u\epsilon i]$ occurred, the rest (cf. Thai phonology, pp.14-18) had not been acquired).

The amount of vocabulary built up by this stage is more than 50 words (a list of vocabulary is given in Appendix 2.18). These words resemble the adult models in most respects, if not all.

The proto-language is rarely heard in this stage. The child used 'words' to replace the proto-language in conveying his intentions. A question may arise here: Does the child still use pitch contrast to signal the functions practised in the proto-language as by this stage pitches have become lexically contrastive, i.e. tones?

In signalling his intentions, in addition to words, other prosodic and paralinguistic features were also used, e.g. rhythm, tone of voice, nasalization, and facial expression; these were often accompanied by gestures. For example, the dog, [ma:], if he wanted to inform about the presence of a dog (informative function), a happy tone of voice was used, with a smile, but if he wanted his toy dog (instrumental function), quick rhythm, demanding tone of voice, word repetition, and nasalization (crying-like) were used. The affirmative function was mostly conveyed by repeating what the adult said.

Although speech has emerged, meaningless babbling still occurred, especially in verbal play while he was playing. Thus, the transition from babbling to speech is not at all an abrupt process.

C o n c l u s i o n s a n d D i s c u s s i o n

The development from vocalizations to speech of the child under study appears to follow a consistent pattern, namely, Interaction, Learning, Practice, and Use. These four strategies are present in each stage of development.

In summarizing the speech development, the conclusions will be divided into four parts:

1. The general development of vocalizations from Stage I to Stage X (0;3.0-1;6.0)
2. The development of tones
3. The development of aspiration
4. The development of final glottalization.

The General Development of Vocalizations from Stage I to Stage X

The general development of vocalizations is summarized below:

In Stage I (0;3.0-0;3.22), the vocalizations were vaguely articulated and were produced mainly with vocalic elements which varied from open to close and vice versa, and from front to central and back together with rounding and non-rounding qualities. Strictures of close approximation and complete closure with which the vocalizations were interspersed varied among labial, alveolar, palatal, velar and glottal places. Pitch appeared to vary among low, mid, high, falling, rising and rising-falling. Nasalization appeared randomly.

Vocalizations in Stage II (0;3.23-0;4.19) were still variable as those used in Stage I, but there was an increase in the use of back rounded vowels, of alveolar sounds, and of syllable patterns,

i.e. disyllables with homorganic articulations appeared. Furthermore, screeching vocalizations with a combination of high pitch and normal pitch registers were produced.

In Stage III (0;4.20-0;5.15), the vocalizations were mainly strongly articulated and accented; they became more rhythmic and more patterned. It was possible to group vocalizations into two types: 'checked' and 'non-checked'. The 'checked' were vocalizations interrupted by stricture of complete closure; the 'non-checked' by strictures of close approximation and open approximation. All these were produced in monosyllabic and disyllabic patterns. The monosyllables were produced with any one of the five different pitches: low, mid, high, falling and rising; the disyllables were produced with restricted pitch patterns. Nasalization did not appear randomly at this stage.

In Stage IV (0;5.16-0;7.20), the fixed patterns of syllable and pitch were still in use. The combination of high pitch and normal pitch registers which occurred in screeching vocalizations now appeared as 'singing tunes' in the baby's vocal play with front and back vowels. In this stage regular patterns of pitch occurred more frequently and were used to convey 'meanings' in interaction. As the vocalizations became regularly patterned, a basic system and a peripheral system of vocalizations were set up.

In Stage V (0;8.0-0;10.15)^{*1}, what appeared in Stages III and IV remained in use, but in the vocal play more complexity was shown in the use of a closed syllable pattern, i.e. CVC, of rising and high pitches in the singing tune, and of final glottal constriction. Moreover, the use of a proto-language with a particular pitch contrast and

*1 No data were available between 0;7.21 and 0;7.30.

certain 'meanings' appeared consistently. Syllable patterns used in the proto-language were very simple, i.e. only V or $^cV^c$ (where c = glottal stop) occurred.

In Stage VI (0;10.16-0;11.12), the proto-language was still in use; the syllable patterns remained the same as those in Stage V. Front vowels were predominant with both 'checked' and 'non-checked' vocalizations. There was progress in that back rounded vowels began to appear more frequently in syllables, first with 'non-checked' onset, later also with 'checked' onset. Verbal attempts were made in imitation; final glottal constriction and final closure at alveolar and velar places were also imitated. The singing tune vocalizations were seldom produced. The basic and consistent pitches in use were mid and low; syllables produced on a low pitch were often accompanied by final glottal constriction.

In Stage VII (0;11.13-1;1.02), the general picture of vocalizations was similar to the previous stage, but this stage was the starting period of first words, i.e. one word utterances appeared. The first words were in CV and C_1VC_2 forms, but the C_1VC_2 form was simple in that there was no contrast in place and manner of C_1 and C_2 , e.g. [-mam], [-ʔʔ]. The first words were also used to replace some functions conveyed earlier by the proto-language. The basic tones^{*1} were mid and low; rising pitch was produced more often than before within familiar syllables, but did not appear as yet with words.

Stage VIII (1;1.03-1;2.24): one word utterances were produced increasingly, and speech was now used to replace some more of the uses of the proto-language. The words produced in this stage were mainly of the CV or CVC structures where the final C is a glottal stop.

*1 Since pitch became functional at the lexical level, the term 'tone' was used.

Syllable structures not functional in the adult system were absent. Rising pitch and back vowels were practised experimentally in syllables already acquired, and later used with words. Therefore, rising pitch now became a rising tone. Thus, three tones: low, mid, rising, had been acquired. In the vocal play, low, mid, and rising tones appeared in combination with a greater number of sounds than was the case in words, and syllables of the CVC structure with greater complexity was produced, e.g. [-pap , -pɔp , -faf , -fəʔ , /pɛn].

Stage IX (1;2.25-1;3.23): what appeared in Stage VIII was still in progress, i.e. mid, low, and rising tones; unrounded front and rounded back vowels. In addition, syllables with a close front vowel, i.e. [i] were acquired, e.g. [/mi:], and this sound was practised in familiar syllable patterns. Aspiration appeared to be closer to the conventional quality and longer utterances were attempted. In the vocal play, high pitch was used, and in addition to the types produced in Stage VIII, there was progress in the CVC form, i.e. [-tət , -blɛb , -tə^d] were produced.

Stage X (1;3.24-1;6.0): two and three word utterances appeared in spontaneous productions; words of the CVC structure had greater contrasts in place and manner at onset and ending, e.g. [-phat], 'to blow' [/mɔ:n], 'pillow', [-jen], 'cold', [-tək] 'to dip up', etc. Falling and high tones appeared but were not produced consistently. Initial consonant clusters had not yet appeared. Vocal and verbal play was still produced.

Evidence from the vocalizations of the baby under study shows that his vocalizations were restricted and systematic. In the early babbling he produced both front and back consonantal and vocalic

elements; the back consonants occurred more frequently; this is similar to the reports of Lewis (1936), Leopold (1939) and Irwin (1947), and these consonants were characteristic features of the happy state, in agreement with the findings of Lewis (1936) and Leopold (1939). The vocalic elements appeared to be centralized; the extreme front close vowel, e.g. [i] did not occur as yet. When the vocalizations became more patterned, front consonants and vowels were predominant, those in the back areas were gradually built in. Repetition appeared consistently throughout the ten stages. The findings, therefore, support those who argue that babbling is not random but is systematic (Pierce, 1974 ; Oller, 1976).

These characteristics of vocalizations of the baby in this study are not different from those of babies in non-tonal environments. Thus at the babbling stage, it may be difficult to distinguish children with different language backgrounds, e.g. tonal vs. non-tonal, solely on the basis of vocalizations since most of the features are not different. However, at some stage, e.g. around 10½ months in this study, one can possibly detect the dissimilarity through the appearance of the basic characteristic features of the language of the environment. Therefore, it could be said that the child learnt all his language from those around him, only the spontaneous babbling may have been innate.

The phonetic and phonological development also shows that the baby starts with a minimal system of what is essential for the adult system, i.e. articulations, syllable patterns, and pitch (cf. basic system of vocalizations in Stage IV and basic system of words in Stage VIII and Stage X), and that there is a gradual building-in process in the development. The present study, therefore, supports

the hypotheses presented by others who have worked on babbling, that there is a gradual transition from babbling to speech (Murai, 1963/64 cited in Menyuk, 1971; Gilbert, 1974; Oller et al. 1976; and Delack and Fowlow, In press).

Furthermore, the development of the speech of this Thai child shows a great deal of similarity to Waterson's findings for English (Waterson, 1971; 1976). In spite of the different language environments, the similarity in production, and in growth of complexity appears as follows:

In production, salient features from the models were produced and only a limited number of features were responded to at a time. With regard to place and manner of articulation, if the manner of articulation of the model is salient and familiar, manner of articulation is used in the response. If the manner of articulation is unfamiliar and hard to identify, but place is familiar, same place of articulation but different manner is produced.

Growth of complexity in the speech development of both studies is also similar. That is to say what is new is produced in a familiar frame, i.e. articulations and syllable patterns. Monosyllables start from less complex to more complex, i.e. open syllables first then closed syllables. In the closed syllables, there is no contrast in syllable onset and ending; later contrast in these places appears. In longer utterances, repeated elements are generally used before those with differentiated elements. Finally, it appears that syllables produced in vocal-verbal play have a high degree of complexity than those produced spontaneously in conversation.

In the course of speech development, it appears that the proto-language is a transition stage between communicating without language and communicating with language. It has an important role as a

preparation for the child to use more complex utterances functionally when speech is acquired.

Tone Acquisition

The acquisition of the tones of the child in the present study can be described as a development from pitch which appears to be greatly variable in the early stages (Stages I and II) and gradually less variable. Low and mid pitches are the first to become consistent and basic in the baby's vocalizations, i.e. in Stage IV. These pitches are later further distinguished by the presence of final glottal constriction for the low pitch, and no final glottal constriction for the mid pitch. Low and mid tones are the first to be consistently and functionally used at the lexical level, i.e. Stages VII-X, and then the rising tone appears. These three tones are used from Stage VII onwards. It is not until Stage X when the falling and high tones appear; however, they are inconsistently produced at that time.

The evidence of the sequence in which the tones were acquired by the child under study shows that the rising tone was acquired before the falling tone, and it thus seems that the falling tone was the most difficult for this child. This appears to contradict the Li and Thompson findings that the children they studied had more difficulty with the rising tone than with either the level or falling tones (Li and Thompson, Inpress). These two opposing findings are probably related to the nature of the system of tones in the two different languages.

In Mandarin there is only one falling tone, i.e. (5 1), but there are two tones with a rising component, i.e. rising tone (3 5) and low-

dipping tone (2 1 4), and these two tones, because of their phonetic similarity in ending with rising pitch, would very probably be less easy to discriminate and hence cause problems for production. The children in the Li and Thompson study acquired the high level tone (5 5), early, so the contrast between the high level and the falling tone would seem to be more distinct for the children than that of the high level and the rising tone, as children learn the gross contrasts of language first, and then gradually refine them as illustrated by Waterson in the acquisition of phonology (Waterson, In press).

In the case of the Thai child in this study, the mid and low tones were acquired before the rising tone, and since the child used the low tone for the words with the falling tone (both the falling and the low tones have a falling component cf. pp. 151-158), it appears that the low and the falling contrast was less clear than the low and rising contrast. Thus, the rising tone was acquired before the falling tone, the reverse of the case in Mandarin. However, until more studies are made on the acquisition of the tones in Thai from a larger group of children, it is not possible to say whether the sequence in which the tones of Thai were acquired by the child in the present study is idiosyncratic, or if it is typical for Thai.

By Stage X, one word utterances produced with monophthongs mostly correspond to the adult forms especially when the tones are low, mid or rising, and when the consonants are plosives, affricates, nasals and semivowels. In longer utterances the tones and the consonant onsets are often harmonized, but vowels are more correctly produced (cf pp.177-178). However, there is wider variation in the consonant and vowel systems in Thai than in the tone system and it is seen from the data of later language development which is beyond the scope of this study, that the tone system is mastered at 23 months while the more complex features

of consonants and vowels, e.g. diphthongs, triphthongs, initial consonant clusters, are not yet acquired. Thus, it may be said, in agreement with Chao (1951/1973), and Li and Thompson (In press), that the tonal system is acquired relatively early.

Acquisition of Aspiration

Aspiration appeared indistinctly and sporadically in Stage VI, and gradually became more clearly articulated. It was produced first in terms of friction and/or as a long breathy release after complete closure, e.g. [-βa:], [-p^{əh}a:]. These were more refined in later stages, and by Stage X, the aspirated plosives became functional units contrasting with the unaspirated plosives.

Final Glottalization

Final glottal constriction appeared to be widely produced in the early vocalizations, but it was not until Stage VI when final glottalization appeared to be functional and gradually came to be used in words of the C₁VC₂ structure, where C₂ = stops [p t k ?] in the adult language.

The description of the speech development of the child in this study is not claimed to be complete by any means, since further analysis needs to be done at the semantic and syntactic levels. However, it is

planned to continue the study at these levels and further recordings of the child's speech continue to be made, with a view to continuing the study longitudinally and as completely as possible.

S E C T I O N I I

A p p e n d i c e s

Appendix 1

Adult-baby interaction and adult language addressed to the baby

The study of some other aspects related to language acquisition, apart from the phonetic and phonological development, has not been ignored in the present study. The process of adult-baby interaction and language addressed to the baby are also taken into account, for it is believed that the study of these aspects leads to a better understanding of the language development of a child.

Adult-baby interaction

It has been reported that there are changes in mothers' speech through time (Snow, 1976; Sylvester-Bradley and Colwyn Trevarthen, In press). In the present study, changes are similarly found in interactional-process and in interactional-content.

It was consistently found that the adult^{*1}-baby interaction in this study was conducted in terms of the turn-taking role of conversation (cf. Sacks et al., 1974, and Snow, 1976). Starting from the very early period, i.e. 3 months, the adult appeared to encourage the baby to take his turn in response to his/her speech. The baby,

*1 The term 'adult' used here is not restricted only to the mother, but includes the grandmother and father who, in the natural home situation, had equal roles in interaction with the baby.

on the other hand, seemed to learn to engage in a conversation-like interaction with the adult. He watched the face of the interlocutor, listened to the sounds, and created responses in one way or another

In the early stages in this study, i.e. Stages I and II, most of the time, the adult initiated the conversation and responded with meaningful expressions, babbled back to the baby, or made a comment concerning the baby's action and attention. For example, the baby's stretching of his limbs, or the baby's attentive look (and possibly listening to) at the striking cuckoo clock, etc., was often commented on as part of conversation, e.g.

| gu _g qu: t ^h ai mai luk |	(The baby looks at the clock)
- \ \	

'Is it cuckoo, Baby?'

This is in keeping with Snow's report that even 'burps' are treated by the mother as part of the baby's contribution to the conversation. Thus, the turn-taking role, even at the early stages, appears to be successful.

The examples of adult-baby interaction in the early stages can be seen in Section I, pp. 32-60.

It was seen that the 'dialogue' between the adult and the baby had some content even though the baby produced only contentless utterances. It was the adult who asked a question, answered the question as if the baby had done so, interpreted the baby's response as a meaningful utterance, and expanded it. This can be seen in the following example:

Mother

Baby (0;3.7)

hm
/

h±ə
~

'Hm?'

hm pen nai luk
/ - j - \

'Hm? How are (you), baby?'

ha pen nai na khap
- - -

hε: ↓ ε
\ -

'Yes? How are (you)?'

hm pen nai khap
/ - -

hε:: ha± w ə ẽ:
~ - -

'Hm? How are (you)?'

ɔ: mε: thiŋ phom wai khon diəu ə luk hm
/ \ / - - \ /

'I see. Mummy left me on my own, didn't

she? Hm?'

h? ẽ: h::: ẽẽ h::
- \ - -

(crying-like)

lak*1 nakna: lεkap mɔ:n ni:
/ - - \

'(You) really like that pillow, don't you?'

ɔ: pui nuəi ə khap
- / - -

hε ± ε
- -

'Is Baby Pui tired?'

nak ə luk
- - \

'Is it (pillow) heavy?'

*1 [rak] conventionally.

In the later stages, i.e. III, IV, V and VI, when the baby's vocalizations appeared to be forcefully articulated, and were word-like, the adult repeated the 'words' produced by the baby in conventional form, and expanded the word-like utterances. During these stages, the turn-taking was more successful; both participants shared the role of 'initiator' of the dialogue, i.e. either the baby or the adult initiated the dialogue. Since the adult was aware of the baby's verbal-like productions, he or she tried to encourage him to produce 'word-like' responses in his turn. In such a situation, the adult's expressions appeared to be contentless themselves. Thus, it seemed that in some situations, the adult assumed the same status as the baby, e.g.

Stage IV

GM

| tpa: tpa | tpa: tpa |
| - - | - - |
| ɔ: tpa: tpa: ə luk |
| / - - - - |

Baby

| d^k a: |
| - - |
| dʒa | a: dʒa: d^d | adʒa: | adʒə |
| - - | - - | - - |

'Yes, is it tpa: \tpa:, baby'

Mother

| tpa ʔe: tuk kɛ: | repeated once
| - - - - |
| tʃ:p: ɟɛ: | repeated 5 times
| - - - - |
| tʃ:p: ɟɛ: |
| - - - - |

Baby

laughs
.
.
laughs
.
.
| aɟɛ: |
| - - - - |

However, in interaction when the baby produced the proto-language (Stages V, VI), the adult used meaningful and conventional expressions in response to the baby's utterances (cf. examples in Section I, pp. 93-119 and Appendix 2.8).

During Stages VII-X, the conversational role was most successful. The baby played his role without being prompted. He initiated and responded verbally; sometimes he used the proto-language, sometimes gestures, and sometimes he played the role of a quiet listener, e.g. when he was listening to a story, or as an 'imitator' and 'completer', e.g. in nursery rhyme recitations. The adults usually interpreted the child's intentions, and supported him in achieving them both physically and verbally. The adults assisted and encouraged the child in performing the described actions himself, e.g. to turn on an electric fan, answer a telephone call, which was known in advance to be from his mother, and many other activities. Such evidence is similar to other studies on this line (cf. Bruner, 1975; Snow, 1976). On the verbal side, the adults named objects and pictures, and told him little stories concerning the family and people outside the family. These, certainly, widened his general understanding about the family and society.

As mentioned earlier, the child had certain roles in certain situations. The example below shows the child's role in a story-telling situation where he took part as a quiet listener and responded by using gestures when he was asked to.

A. is telling the child a story making use of pictures in the Ladybird picture book.

- A: [/pui -təa -liəŋ -nok, \ni -ŋai] (A picture of bird is
'Pui wanted to keep a bird, pointed to)
here it is.'
- A: [/pui -təa -liəŋ -nok] (repeats)
'Pui wanted to keep a bird.'
- A: [\phə: \kə -tham \thi: -liəŋ -nok \hai]
'So, Daddy made (Pui) a place^{*1} to keep a bird.'
- A: [\təhai -mai]
'Didn't he?' (A asks P)
- A: [/pui \kə \təhuəi -tham \luet]
'And Pui helped (Daddy) with the wire screen.'
- A: [\təhuəi -tə:k -ta -pu:]
'Helped (Daddy) with hammering.'
- A: [-tə:k -ta -pu: -jaŋ -ŋai] (A asks P)
'How does the hammering go?'
- A: [-tə:k -ta -pu: -paŋ -paŋ]
'The hammering goes -paŋ -paŋ' (onomatopoeia)
- A: [-tə:k -ta -pu -ŋai /pui -tə:k -jaŋ -ŋai] (A asks P)
'How does the hammering go, Pui? How does
the hammering go?' (P does the hammering
gesture)
- A: [-ə: -tə:k -jaŋ -ŋan] (A is pleased)
'Yes, hammering like that.'

It is very interesting to see that the child knew his role
as a listener and a reactor, and promptly reacted by doing what the

*1 The adult did not use the word for 'cage' [-raŋ -nok] in the
story, but simplified it.

adult asked him to do. In this case he switched his role from the one role to the other.

The discussion of language addressed to the baby in such a situation will be considered in the section on adult language addressed to the baby.

In a nursery rhyme or alphabet rhyme situation, the adult read or recited a rhyme; the baby responded to the rhyme by imitating verbally (cf. the examples in Section I, pp. 126-134), and gradually developed from the read (recite)-repeat process to the read (recite)-complete process, i.e. the adult read or recited the first part of the rhyme, and the child completed the second part. This process is an interesting case of similarity in interaction between the baby in the Thai environment and an English baby (studied by Waterson). For example

Thai child (1;3.0)

Adult	Child
[-ka: /ɿi -ka: -bin -ma: - -]	[-wəi -wəi] (wai-wai)
'Crow, crow, do fly here - - '	'quickly, quickly'
[-hɔ: -nok \hu:k - -]	[-a -to:] (-ta: -to:)
'[h] for Owl - - '	'big eyes'

English child (1;3.0) - example from Waterson

Adult	Child
'One, two, three, four, five, six, seven,	
All good children go to - - '	[hevm]
(1;4.0)	
'A for - - '	[æpv]
'I for - - '	[iŋk]

The changes in content of interaction can be seen in the difference between the pre-verbal stage, and the one word utterance stage.

During the pre-verbal stage, the content of the 'dialogue' was mainly about the child and things in the immediate environment, varying from the child's actions, objects and persons present in the environment, or pictures in the picture book. All these were commented on with present time reference only. During the one word utterance stage, the content of interaction also included the relationship between the child the the outside world, e.g. train, car, place, person. Time reference was either present or past (cf. example in Section I pp. 166-168). The changes in process and in content of interaction through time thus reflect the linguistic and cognitive growth of the developing child.

Adult language addressed to the baby

The language addressed to the baby in this study, varied according to different situations. In a 'conversation' and in a story-telling situation, the utterances used by the adult appeared to be long, but slow and repetitive. In some situations, the language spoken to the baby appeared to be an imitation of his babbling, or an adaptation of the babbling to fit a meaningful word in the adult language. Furthermore, when stimulating the baby to produce word-like utterances, the adults also reduced the number of the syllables in the utterances. The latter became shorter and shorter and eventually ended up as 'one word' utterances, e.g. a phrase was reduced to a word, a disyllable to a monosyllable.

Nevertheless, some features were found to be common throughout the period of this study. These characteristic features are the lengthening and shortening of vowel length, the prolongation of pitch, the use of high pitch register, the repetition of expressions, and high frequency of interrogatives. Such features have also been found to be typical in language addressed to young children in other languages (Ferguson, 1964; Garnica, In press; Ruke-Dravina, In press, Snow, 1976).

*1 The lengthening and shortening of vowel length together with a change of lexical pitch result in some rule-breaking syllables. As in some other tone languages, the tones in Thai are governed by phonological rules. The lengthening and shortening of vowel length in some words in this study violate the phonological rules of the tones. The words commonly used with such modifications are sentence-ending particles; for example, the politeness particle for men, [ˈkhrap], and the word [ˈlu:k] which is used as a second person form of address, meaning 'baby'.

Prolongation of vowel length in the particle [ˈkhrap] is found consistently, e.g. [ˈkha:p] or [ˈkha::p] or with even greater length of vowel. (The absence of [r] in the initial cluster is a common feature of this particle in colloquial Thai.) This word is conventionally in a form with a short vowel and a high lexical tone.

Reduction of vowel length is found in the word [ˈlu:k] which has a form with a long vowel and falling lexical tone. In this study it is used varying in form with [ˈluk], [ˈluk], and [ˈluk], i.e. short vowel with falling, mid, or low pitch. These modifications

*1 This part has been reported in Tuaycharoen (In press).

break the conventional rules of the phonological structures of the language which are given below:

Some phonological rules of Thai words:

$C_1\check{V}C_2$ $C_2 = \text{stop}$, $\bar{V} = \text{long vowel}$, $\check{V} = \text{short vowel}$,

$C_1\check{V}C_2$ — { high tone : [$\bar{\text{khrap}}$] polite word for men
low tone : [$_ \text{khap}$] 'to drive'

$C_1\bar{V}C_2$ — { falling tone : [$\backslash \text{khra:p}$] 'a stain'
low tone : [$_ \text{kha:t}$] 'to be torn'

In Thai a syllable with a stop ending and a short vowel occurs only with a low or a high tone. A syllable with a stop ending and a long vowel has a low or falling tone.

Modified forms used by adults in addressing the baby

Conventional		Modified
[$\bar{\text{khrap}}$]	_____	{ [$\bar{\text{kha:p}}$] [$\bar{\text{kha::p}}$]
[$\backslash \text{lu:k}$]	_____	{ [$\backslash \text{luk}$] [$_ \text{luk}$] [$_ \text{luk}$]

These modifications are linguistically explicable. In Thai, the sentence-ending particle may be produced with difference in pitch from its lexical tone (cf. Henderson, 1970: 44-50). The word [$\bar{\text{khrap}}$] is an ending particle by nature. The word [$\backslash \text{lu:k}$] is

a noun meaning 'offspring', but it is used in the language addressed to children as a subject, as an object of a sentence, or as a second person form of address. As a subject and an object, the tone is never varied; as an address form it is used in the same way as an ending particle, so it can be termed a 'vocative particle'. Variation in pitch of the so-called vocative particle is possible.

The modifications of forms found in this study are systematic in that the change of pitch is constrained by the lexico-semantic restriction of the word. That is to say, the same form can be used with a different pitch only if it does not have a meaning contrast in other contexts.

For example, [ˈkha:p], [ˈkha::p] for [ˈkhrap].

As long as the pitch is high they are acceptable and have the semantic interpretation of a polite form. However, the following are not possible for forms for [ˈkhrap] even though they are admissible in terms of phonological rules:

[ˈkhap]	'to drive'
[ˈ\kha:p]	'to mouth'
[ˈ\khra:p]	'a stain'

This is because they are meaningful in other contexts.

[ˈ\luk], [ˈ-luk], [ˈ-luk], for [ˈ\lu:k] as a vocative particle are semantically admissible in this context since

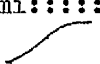
[ˈ\luk]	never occurs in other contexts
[ˈ-luk]	never occurs in other contexts
[ˈ-luk]	never occurs by itself in the language except as the first syllable of a disyllabic word, e.g. [ˈ-luk -lik]

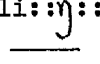
'naughty'.

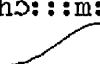
The form [luk], i.e. with high tone, can never be used as a modified form of the vocative particle since it is meaningful as a verb, meaning 'to rise'.

The prolongation of pitch occurred as a concomitant feature of increased vowel length or with prolongation of nasal closure, e.g.

Adult-baby

| mi::::: |


| li::y::: |


| ho::m::: |


Adult-adult

| mi: | 'bear'


| liŋ | 'monkey'


| ho:m | 'scent'


With reference to the use of high pitch register, this was more frequent during the early stages than in the later stages. During the early one word utterance stage, the adult also produced words whose lexical tones are falling, rising, and high, with high pitch register in spite of the fact that these tones have a high pitch range component, i.e. falling from high to low for falling, rising from low to high for rising, and high with a slight rising for high. Therefore when words with these tones were produced with high pitch register they sounded higher than the normal octave range of pitch. This affected the way the child learnt the tones, for instance he produced words with rising pitch in

the same way as the adult^{*1} (cf. the phonetic description of the child's rising pitch in Section I, pp. 149-150). Not until Stage X when the adults produced the above-mentioned tones with normal pitch range did the child produce such tones with normal pitch register.

What is striking in the present study is the use of high pitch register by men. The baby's father and other male visitors when directly addressing the baby, used very high pitch.

For example, Y, a male visitor, stops and talks to the baby who is producing a 'protest cry', and then turns to speak to the baby's grandmother.

Y

Baby

(very high pitch)

| e:: | lɔ:ŋ^{*2} | jai lɛu |
| - | - |

'Ey, what are (you) crying for?'

| ɛ::: ɔ:i ɛ::: ɔ:i |
| - - - |

Baby stops crying
and watches

(Meaningless)

(very high pitch)

| pai thiəu mai kha: | (palatal clicks)
| - ~ - |

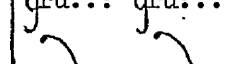
'Want to go out?'

*1 It was found in the more recent observation, i.e. when the child was 2 years 8 months, that the child produced some consonantal units, with features of those in his grandmother's speech (cf. p. 19). For example [khw-] for [f-], e.g. [-khwan] for both [-fan] 'tooth' and [-khwan] 'smoke' which was confused at the lexical level. However, after remedial sessions, these two sounds were contrastively produced.

*2 [-rɔ:ŋ] conventionally.

Y

(very high pitch)

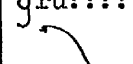
| ʔ:::i ʔ:::i | (palatal clicks) | ʔru:: ʔru:: |


(very high pitch)

| he: he: | (claps hands) | he::: |
 | - - | | — |

Y turns and talks to the baby's grandmother using normal pitch register; then addresses the baby again.

(very high pitch)

| ʔru::: |


(Utterances without translations are meaningless sounds made to draw the baby's attention.)

When transcribing the tape, the writer did not realize at first that it was a man speaking until he spoke to the baby's grandmother using his normal pitch range. Not only did the high pitch cause him to sound like a female, but also his use of a female politeness particle, [ˈkha]^{*1} (with additional length), in the second utterance.

The use of female politeness particles to babies (both sexes) may be heard in some families, but in general in talking to a young boy, adults use a male politeness particle, [ˈkhrap], and any one of the female politeness particles, [ˈkha], [ˈkha:], [ˈkha], to a young girl in order to teach the correct politeness formulae to children.

*1 For more detail, see also Henderson, 1970.

The type of utterance used by the adults in this study was mostly interrogative. Among the interrogatives, the frequency of wh-questions is greater than that of yes-no questions. Both types of question were used right from the beginning and to the end of the study (i.e. 3-18 months). During the early stages, it is obvious that the adults did not expect an 'answer' at all from the child; however, as the child's knowledge about the world increased, an answer was expected.

The use of wh-questions in the later stages, i.e. Stages V-X, when an answer was expected, was still constrained by the child's production ability. The adult automatically acted as a caretaker of the child's linguistic ability by selecting certain types of question which would elicit an answer from the child without much difficulty. A similar strategy has been reported; Blount (1972) finds that adults tend to ask only the kind of wh-questions which children can answer at a particular stage.

The selection of wh-questions in certain stages in the present study is discussed below.

During Stage V, the child had been taught to identify things in his environment and parts of his face. He therefore had been exposed to the where-question and a request expression which were used in the forms of

Where is ?

Point at please.

Thus, it appeared that the 'where-question' was used in addressing the child before the 'what' and 'who' questions, since it did not require verbal responses; only a pointing gesture can be a perfect answer to the 'where-question' which was related to the places of

objects in an immediate environment. In Stage VII (0;11.03-1;1.02), when the few first words appeared, a number of 'what-questions' were used to address the child, to which he responded using his first few words. For example, a picture of a cow or an elephant was pointed to with the question 'What is this?' [\ni: -a-rai]. The child responded to the question saying [-wuə] 'cow'. However, he did not use the same word in response to a picture of a horse or a dog, i.e. [-ma:], [/ma:]. He either stayed quiet or used the proto-language to acknowledge it. This is because he was not yet capable of producing those two words.

In addition to the more frequent use of 'what-questions' to elicit an answer from the child, the adult also extended the words for animals and objects, especially those from his picture book, by adding the onomatopoeic forms for them, e.g.

[-mæ:u -miəu -miəu] 'cat, meow, meow'
 [[-kuk -kai -tɕiəp -tɕiəp] 'chick, tɕiəp tɕiəp'
 [[-rot bbb:: bbb::] 'car, br:: br::'





Additional extension in relation to materials in the book was done by referring to places where real animals or objects belonged, and where the child had already been or seen them. In other words, the extension was done by recalling actual situations experienced by the child, e.g.

[-kra -ta:i \ba:n -ta: -bu-tɕha:] 'rabbit at Grandpa^{*1} B's house'
 [-pla: \ba:n -luŋ -wi-tɕhai] 'fish at Uncle^{*1} W's house'
 [-bua \ba:n -luŋ -wi-tɕhai] 'lotus at Uncle^{*1} W's house'

*1 These are kinship terms used by those younger to their elders even though they are not relatives.

Such extension certainly prepared the child for the question 'how' and 'where' - which referred to a non-immediate environment. The child later used words, such as [-ta: -bu-tɕha:], [-luŋ -wi-tɕhai], as names of the places where he had been to see fishes, lotuses (cf. examples in Section I, pp. 166-167).

The 'how' question, which adults began to use during Stage VII, elicited vocal and non-vocal responses, e.g.

vocal:	| m:: |	or	[?] ũ: |	for 'monkey' [-liŋ]
				
	| |		| |	for 'car, plane, train'
non-vocal:	laughter for laughing manner			
	swaying movement for movement of fishes			
	clapping hands for pleasure			

During Stages VII-X, most of the wh-questions were used, i.e. 'who', 'what', 'where', 'how', in spontaneous situations. The use of these questions appeared to elicit answers in terms of 'identification' as follows:

- i) Person or object identification, e.g. who is this (that)?
what is this (that)?
- ii) Action identification, e.g. what is he (she, they) doing)?
- iii) Location identification, e.g. where is (persons, objects)?
- iv) Manner identification, e.g. how does a tiger roar?
how does a monkey cry?
how does a fish move?

What all the adults did after the child answered, was to repeat what he had said and praise him if the answer was correct or was what they expected. However, when the answer was not

acceptable, the question would be repeated again and again or sometimes a certain expression was used to hint to the child that the answer was not satisfactory. The child then corrected himself until a sign of approval was produced.

It is noticeable that even by the end of Stage X, i.e. 18 months, the 'when-question' had never been used by the adult since the child was judged not yet capable of answering with time reference.

The most common feature of language addressed to the child in this study is repetition of utterances. The repetition may be full repetition, or partial repetition. In the latter case there was a small difference in lexical choice, particles, pitch of sentence ending particles (cf. pp. 206-208), deletion or addition of particles or lexical items. It is certain that the adults were not at all conscious of using words or sentences repetitively in addressing children. As a native speaker of the language, the writer was certain that the adults would not do the same in adult-adult interaction.

The examples of repetition of adult language spoken to the child can be seen in the examples of interaction illustrated in this study.

In addition to the above-mentioned features of language addressed to the child, other features were also found in a story-telling situation. In such a situation, a story was made up referring to the child and the child's experience - a similar case was described by Doroudian (1975), and there was frequent use of certain sentence particles, and greater use of nouns than pronouns - this has also been reported in Ferguson (1964).

The sentence particles, e.g. link sentence particle [ɿkɔ̌], and complete-action particle, [lɿi]^{*1}, were used frequently in a story-telling situation. They have no referential meanings, but interestingly, appeared early in the child's speech, and were used by the child regularly when he told his caretaker a story from his picture book (at 24 months). Examples of language addressed to the child in the story-telling situation can be seen on p. 203, and in the example below.

(0;10.15)

His aunt (A) made a story up from the pictures in his Ladybird picture book. (The sentence particles mentioned above are underlined.)

- A: [-wa:n -ni: -wan_kɿ:t /pui] 'Today was Pui's birthday'
- A: [-lɿu ɿkɔ̌\phɔ: -pai -su: /ma: \hai
-tuə-nuay] 'So Daddy bought (Pui)^{*2} a dog.'
- A: [/ma: /ma:] 'dog dog' (A repeats the familiar words)
- A: [-su: -muək \hai \duəi] 'Daddy also bought (Pui) a hat'
- A: [/ma: \hai \duəi] 'dog also'
- A: [-set -lɿ:u ɿkɔ̌ -tɕu:ŋ /ma:
-pai -dɿ:n \len] 'Then took the dog for a walk'
- A: [-tɕu:ŋ /ma: -pai -dɿ:n \len] 'Took the dog for a walk'

*1 This particle may also be used as a sentence link particle.

*2 Words in the brackets imply the omission in actual speech. In colloquial Thai, the subject and object of a sentence are often omitted when the context is known to participants.

- A: [/ma: \kɔ̌ ˈlɤʔ ˈthaj -tuə -tem 'The dog got dirty all over
 -mot -lɤi /fon ˈtok] (because) it rained'
- A: [-klap \ba:n \kɔ̌ -au/ma: ˈpai ˈa:p 'When got back home,
 ˈna:m] gave the dog a bath'
- A: [-a:p ˈnam] 'a bath'
- A: [-set ˈlɛ:u \hai /ma: ˈnɔ:n -nai 'After that put the dog to
 -ta \kra:] sleep in a basket.'
- A: [ˈlɛu \kɔ̌ \lu:p /huə -man] 'and stroked his head'
- A: [\lu:p /huə -man -jaŋ ˈŋi: -jaŋ 'Stroked his head like this,
 ˈŋi:] like this' (A strokes P's hair)
- A: (higher pitch)
 [-nuk \mai -nuk] 'Is it fun?' (A asks P)
- P laughs
- A: [-ə: -nuk] 'Yes, it's fun'

What is typical in an adult-baby story-telling situation, which is found in the example above and in the others from the data appears to be natural characteristics of adult teaching strategies in communication and in explanation of expressive meaning. They are:

- relating a story referring to a past experience of the child;
- applying gestures and actions to the child whenever they were appropriate;
- repeating words and expressions which were familiar to the child;
- using sentence particles, e.g. [\kɔ̌] appeared five times from eight meaningful utterances, excluding repetition;

- using onomatopoeia to give word meaning;
- using kinship terms and real names which were also applied to people in the picture book, e.g. parents, neighbours and himself. This must have assisted the rapid learning of the names of people, animals, and objects in the environment.

The adult language does affect the child's speech. This can be seen in the use of high pitch register for rising pitch (tone), in the vocabulary used by the child, i.e. the vocabulary was produced by the adults repetitively in daily routines and games, and finally in the use of certain particles in stories when the child played a role of a story-teller.

What has been described so far seems to be an entirely natural way of adult-baby interaction. It was obvious that the adults in this study did not plan what they were going to say to the baby, nor think what kind of word or question should be used first or last. Yet the adult's approach appears to be well-organized, centering on the level of the child's linguistic and cognitive growth.

Appendix 2

Examples of vocalizations and verbalizations

Appendix 2.1

Stage I: Repetition in early vocalizations

$\tilde{\epsilon}:\tilde{u}:$	$\tilde{\epsilon}:\tilde{u}^+:$	$\tilde{\epsilon}:\tilde{y}\tilde{u}:$	$\tilde{\epsilon}:\tilde{u}\tilde{y}^+ e:\tilde{y}\tilde{u}^+:$	$\epsilon:\tilde{y}\tilde{u}^+ e:\tilde{y}\tilde{u}^+ e:\tilde{y}\tilde{u}^+$
- -	- \	- \	- - \ -	\ - - -

Appendix 2.2

Nasalization

$\tilde{u}:\tilde{\epsilon}\tilde{u}:$	$\tilde{u}:\tilde{u}:$	$\tilde{\epsilon}:\tilde{a}^+?$	$\tilde{u}:\epsilon\tilde{u}^+:$	$h\tilde{a}$	$\tilde{u}^j w\epsilon\tilde{u}^w\epsilon:$
\	\	\	\	-	- - -

$\tilde{u}:\tilde{\epsilon}:$	$\tilde{u}^j\epsilon:$
\	-

Appendix 2.3

Labialization

$\tilde{y}\tilde{u}^+ \tilde{y}\tilde{u}^+:$	$\tilde{y}\tilde{u}^+ \tilde{y}\tilde{u}^+ \tilde{y}\tilde{u}^+:$	$\tilde{y}\tilde{u}^+ \tilde{y}\tilde{u}^+ \tilde{y}\tilde{u}^+:$	$\tilde{u}^w e \tilde{u}^+ e$	$\epsilon\tilde{u}^+ w\epsilon\epsilon^+?$
-	-	-	-	- \

Appendix 2.4

Stage III: Vocalizations with fixed patterns of pitch

High-Mid	$\epsilon p p a$	$a p p a$	$a d d a$	$a d d a$	$h a:d, d\epsilon\epsilon$	$h a d d \epsilon\epsilon$
	-	-	-	-	-	-
Mid-Mid	$t\epsilon\epsilon d\epsilon\epsilon$	$a t t a$	$a:d d\epsilon\epsilon$	$a::d\epsilon\epsilon$	$a d t a:$	$a d t \epsilon$
	-	-	-	-	-	-
Falling-Mid	$a:\epsilon d\epsilon a$	$a a::\epsilon d\epsilon a$	$a:\epsilon d\epsilon\epsilon$			
	\	-	-			

e→
 - | ?:: | | ?a: | | ε:at̥ta | | #ppa | | #ppa | | #ppa | | εppa | | appa | | adda adda |
 | - | | \ | | \ - | | - | | - | | - | | - | | - | | - | |
 <
 | ε:̣:pa | | a:dḍla: |
 | \ - | | - | |

Appendix 2.6

Stage IV: 'Singing tunes'

(a) np → np → np → np
 | ε:ō::ō::ō: | | ε:ō::ō::ō: | | ε:ō::ō::ō: | | ε:ō::ō::ō: |
 | - \ \ \ | | - | | \ - \ | | - \ - | | - \ - |
 hp → np → np → np
 | ε:ō::ō::ō: | | ε:ε:ō: | | ε:ō: | | ε:ō::ō::ō: |
 | - \ - | | \ | | \ | | \ |
 np → np
 | ε: | | ε:ε:ō::ō: |
 | - | | \ - |
 (b) np → np → np
 | t̥rε ? ε:: ? p?̥: | | h̥t̥ p::: h̥ p̥::: | | e::p̥:::p̥̥ |
 | - \ \ \ | | - \ \ \ | | - \ \ \ |
 np → np → np → np
 | ε̥ p̥::: ? ε::: | | h̥t̥: | | ε̥ ?̥ ?̥: | | ε:: t̥r̥t̥ |
 | - \ \ \ | | \ | | - \ | | - \ |
 np → hp → np
 | z::z̥::: d̥rε d̥rε: | | t̥rε: h̥ ε̥ t̥rε p̥p̥ | | p̥:::a:t̥t̥t̥t̥ |
 | - \ \ \ | | - \ \ \ | | - \ \ \ |
 np →
 | t̥a:t̥t̥t̥t̥ p̥::: | | a:t̥t̥t̥t̥:t̥a:t̥t̥a: |
 | - \ \ \ | | - \ \ \ |

(c)

np	→	np	←	np	→	hp	→
pa pa a:p±		pa: pa		a:pa a:p py:py:		a:py:py:...	
-		-		-		-	

hp	→	np	→	hp	→	hp	→
p:: a::ε::p::		pa ^p pa py		ε ε:		ε::ε::ε::	
-		-		-		-	

hp	→	np	→	np	→	np	→	np	→
aβ ^p pa		β::ε::wa		a ^p β::wa		əpy::		βy::wa	
-		-		-		-		-	

np	→	hp	→	hp	→	hp	→	hp	→
pa:pa: pe [?] ε:		a:ε::		a:ε::		ε:əε::		ε::ε::ε::	
-		-		-		-		-	

hp	→	hp	→	?	→	np	→
ε::ε::ε::ε::		ε::ε::ε::ε::		ε::ε::ε::ε::		ε::je::a	
-		-		-		-	

hp	→	hp	→	np	→
ε [?] a [?] e [?] a [?] a [?] a [?] ε:ə ph e:		e:: a:: a:: a::		e::e:: a::	
-		-		-	

np	→	hp	→
e::a::a:: a::		ε::a ε::a ^h	
-		-	

hp	→
ε::a::	
-	

pause

Appendix 2.7

Stage V: 'Singing tunes'

(a)

np $\xrightarrow{\quad}$ np $\xrightarrow{\quad}$ hp $\xrightarrow{\quad}$

| m::: m::: | m::: m::: hm | ɔ:: ɛ ja:: ɛ a:: ɛ a:u | -

np $\xrightarrow{\quad}$ hp $\xrightarrow{\quad}$ hp $\xrightarrow{\quad}$ np $\xrightarrow{\quad}$

| ~ a::w_jɛ | a::: (shriek) | ɛ:: ɛ a::: | ɛ::: ɛ::: hə |

ɛ::: hə ɛ::: ə |

(b) 'Checked' and 'non-checked' vocal play

Mother

Baby

| tʃɛ tʃɛ tʃɛ |

| mai khui kə mɛ: ə luk |

'Doesn't baby want to talk to Mummy?'

| addʒa addʒa | (repeats)

| hʔ m::: m::: |

| dʒɛ dʒɛ dʒɛ | dʒɛ: ʔyʔ |

| m::: m::: | dʒɛ: dʒɛ: | -

| a dʒr::: | a dʒr::: | a dʒbb::wa | -

| a dʒr::de | a dʒr:: | a:up::py:: |

| appa appa |

$\begin{array}{|c|c|c|c|c|} \hline ?ui & ?ui & ?ui & kat & m\epsilon: & mai & ?au \\ \hline \end{array}$	$\begin{array}{|c|c|c|c|} \hline a^{d_{gr}}:: & dza & ?a: & ?\acute{o}: \\ \hline \end{array}$	laughter
--	--	----------

'Ouch! Don't bite Mummy.'

shriek

$\begin{array}{|c|} \hline a: :: :: :: \\ \hline \end{array}$

(c) 'Checked' vocalizations and responses

Grandmother

Baby

$\begin{array}{|c|c|c|c|c|} \hline t\phi a: & t\phi a: & t\phi a: & t\phi a: \\ \hline \end{array}$	$\begin{array}{|c|c|c|c|c|} \hline at\epsilon: & att\epsilon & t\hat{t}\epsilon & t\hat{t}\epsilon & t \\ \hline \end{array}$	$\begin{array}{|c|c|c|c|} \hline at\epsilon: & t\epsilon: & t\epsilon: \\ \hline \end{array}$
$\begin{array}{|c|c|c|c|} \hline t\epsilon: & p\hat{t}a: & p\hat{t}ap & p\hat{t}\epsilon: \\ \hline \end{array}$	$\begin{array}{|c|c|c|c|} \hline t\epsilon: & p\hat{t}a: & p\hat{t}ap & p\hat{t}\epsilon: \\ \hline \end{array}$	$\begin{array}{|c|c|c|c|} \hline t\epsilon: & ?yp \\ \hline \end{array}$
$\begin{array}{|c|c|c|c|} \hline p\epsilon: & ?e: \\ \hline \end{array}$	$\begin{array}{|c|c|c|c|} \hline p\epsilon: & ?e: \\ \hline \end{array}$	$\begin{array}{|c|c|c|c|} \hline p\epsilon: & ?e: \\ \hline \end{array}$
$\begin{array}{|c|c|c|c|} \hline t\phi a: & t\phi a: & t\phi a: & t\phi a: \\ \hline \end{array}$	$\begin{array}{|c|c|c|c|} \hline h_a & p\hat{t}\epsilon: & p\hat{t}p\hat{t}p\hat{t} & p\hat{t}\epsilon: \\ \hline \end{array}$	$\begin{array}{|c|c|c|c|} \hline at\epsilon^{\hat{t}} & t\epsilon^{\hat{t}} \\ \hline \end{array}$
$\begin{array}{|c|c|c|c|} \hline t\phi a: & t\phi a: & (repeats) \\ \hline \end{array}$	$\begin{array}{|c|c|c|c|} \hline t\phi a: & t\phi a: & (repeats) \\ \hline \end{array}$	$\begin{array}{|c|c|c|c|} \hline t\phi a: & t\phi a: & (repeats) \\ \hline \end{array}$
$\begin{array}{|c|c|c|c|} \hline t\phi a: & t\phi a: & (repeats) \\ \hline \end{array}$	$\begin{array}{|c|c|c|c|} \hline t\phi a: & t\phi a: & (repeats) \\ \hline \end{array}$	$\begin{array}{|c|c|c|c|} \hline t\phi a: & t\phi a: & (repeats) \\ \hline \end{array}$

Appendix 2.8

Stage V: 'Proto-language'

- (a) P was playing with his toy box. Laughter was heard. After a while he deliberately dropped the box into a narrow gap between his play bed and the wall, and turned to his grandmother:

Grandmother

Baby

ε:: (Inf)
—

ɔ: man tok loŋ pai ə luk
\ - - - - \

'Yes, it has fallen down'

luk thiŋ man loŋ pai tham mai a
\ - - - - -

'Why did Baby drop it?'

khun ja:i kep mai dai
- - - \ \

ʔ₁ (Ins) 'I want'

'Grandma can't pick it up for Baby'

ʔ₂ (Ins) 'I want'

luk tɕhɔ:p thiŋ khɔ:ŋ ruəi
\ \ / /

'Baby likes throwing things away.'

khun jai kep hai luk mai dai
- - - \ \ \ \

^hε:: (Aff) as if he understood that the toy could not be reached, and he turned to play with another toy.

'Grandma can't pick it up for baby.'

(b) P was with A; both were 'reading'.

A

Baby

| ε |	| ε: |	(Inf): pointing at
| - |	| - |	the teddy bear in
		the book.

| teddi: bɛ: |
\ -

| ε |	| ɛ̃ |	(Aff)
-	-	

'Teddy-bear'

| nai hɔ:m teddi: bɛ: thi |
/ / \ -

P 'kisses' the picture of a
teddy bear several times

'Give Teddy bear a kiss, Baby.'

| phɔ: lɛ:u |	| a:n naɲ su: ma |
-	- / -

| a |	(Aff)
-	

'That's enough, go on reading.'

| tɕa: naɲ su: pui ɲai |
\ / / -

'Yes, Pui's book, isn't it?'

| nai nɔ:ɲ a |
/ -

P kisses the picture of a
baby boy.

'Where is your 'brother'?' (picture of
a baby boy)

| ɛ̃ |	| ε: |	(Inq)
/	/	

| nan pla: |
\ -

'That's a fish.'

Appendix 2.9

Vocal play

(a) Stage V: Labial vocalizations with breathy articulation

| aŋu: bbb bε: | blε: blε ablε: | ε: a:± pε: pε:u | p^ha:u: bpa:u | -
 - | hε hu^b pa:u ?u ba: u pa: | pause | m pa:: əpa:: | apa: pa | pa: | -
 - | abbb^h abbb abbb ba:: ha: | -

(b) Non-labial vocalizations

| ŋ, ñā | ñā: | əñ, ñā | ñē: | ε: | əñ, ñā | | ññ, ñā:: | ññā: | ññā: | ññā:: |
 - | - | - | - | - | - | | - | - | - | - |
 pause | dza | dza: ? | dza: | a::zz±::: | d^hzə | nē: | z::: | d^hzə | pause
 - | - | - | - | - | - | - | - | - | - |
 | q::: | q::: | pa | ən^dja | | dza: | q±::: | q±::: | dā: | q±: dā: | q±::: |
 - | - | - | - | - | - | - | - | - | - |
 - | q±::: | q±::: | əz:: ja: | dā: | z±::dā: | t̥a: | əq±::: | d^hzε d^hzε: | -
 - | - | - | - | - | - | - | - | - | - |
 - | ^ε ?_δ:::: ?_δ | pause (being interrupted by M)

Appendix 2.10

Stage V: Interaction

(a)

A

ta: ta: | pa: pa: |
- - | - - |

wa: wa: ta: ta: dai lɛ jan |
- - - - \ - |

'Can (Pui) say [-wa: -wa: -ta: -ta:]?' No response

pui ta: ta: dai lɛ jan tɔa |
/ - - \ - - |

'Can Pui say [-ta: -ta:]?'

Baby

əpɛ: ^bɛm::wa | m::wa | pause
- - - - | - - |

^bəpa:
- - |

(b) P was happily playing with velar sounds on his own. His aunt was nearby listening, interrupting, and producing velar and alveolar sounds.

A

< <
a::y̥u:
- - |

Baby

laughter | hɛ::y̥ | a::y̥u | -
- - - - | - - - - |

- | ^ɕg kx:: | a::y̥ɛ:: | -
- - - - | - - - - |

- | a::y̥::y̥u | ^ɕɛ::y̥u: |
- - - - | - - - - |

y̥:: | ay̥:: | a:y̥::ɛ: | pause
- - - - | - - - - |

A
 $\begin{array}{|c|c|c|} \hline \angle & \angle & \angle \\ \hline \text{ta:} & \text{a:ga:} & \text{a:ga:} \\ \hline \end{array}$

$\begin{array}{|c|} \hline \angle \\ \hline \text{a:ta:} \\ \hline \end{array}$

$\begin{array}{|c|} \hline \text{a: ta:} \\ \hline \end{array}$

$\begin{array}{|c|} \hline \text{a: ta:} \\ \hline \end{array}$

repeats

repeats

$\begin{array}{|c|} \hline \text{ta:} \\ \hline \end{array}$

Baby

$\begin{array}{|c|c|} \hline \text{a:}\gamma::\text{ga:} & \text{e:}\gamma \\ \hline \end{array}$

$\begin{array}{|c|} \hline \text{e:a:k}^h \\ \hline \end{array}$

$\begin{array}{|c|c|c|} \hline \text{a::da} & \text{a:}\underset{\angle}{\text{d}}\text{e:} & \text{e:}\gamma^+ \\ \hline \end{array}$

$\begin{array}{|c|} \hline \text{a:}\gamma^+:: \\ \hline \end{array}$

no response

$\begin{array}{|c|} \hline \text{a:} \\ \hline \end{array}$

$\begin{array}{|c|} \hline \text{e::da:} \\ \hline \end{array}$

(c) A had been saying $\begin{array}{|c|} \hline \text{e::la} \\ \hline \end{array}$ to P. P could not respond, but handed his shoes to A.

A
 $\begin{array}{|c|c|c|c|c|} \hline \text{la:} & \text{la:} & \text{la:} & \text{la:} & \text{la:} \\ \hline \end{array}$

Baby

$\begin{array}{|c|c|c|} \hline \text{ndze} & \text{pause} & \text{n::je:} \\ \hline \end{array}$

$\begin{array}{|c|c|c|} \hline \text{dke:n::dza:} \\ \hline \end{array}$

$\begin{array}{|c|c|c|} \hline \text{?}_{\xi} & \text{?}_{\xi} & \text{?}_{\xi} \\ \hline \end{array}$ (P wants A to take his shoes)

$\begin{array}{|c|c|c|} \hline \text{?}_{\xi} & \text{?}_{\xi} & \text{?}_{\xi} \\ \hline \end{array}$ (pointing at the door)

(P wants to go out)

A

Baby

| pai nai a pai nai |
| - / - - / |

'Where do(you)want to go?' (repeats)

| la: la: thi | fla |
| - - - - |

| ñ: d̥ɛ: d̥ɛ: d̥ɛ: d̥ɛ: |
| - / / / - |

'Say la la please fla.'

(as a condition)

| ɛ ɛ | (wants to go out)

(d) P was investigating his shoe (0;9.16)

A

P

| fəɖa: a: d̥ɛ e: d̥ɛ a: n̥: n̥: |
| - - - - - |

| ɛŋŋa ɛŋŋa: ?a: ?a | (P puts the
- - - - -

shoe into his mouth)

| mai au ja: kat rɔ:ŋ tha:u |
| / - - - - |

'Don't bite the shoe.'

| muə ki: pui wa: ɛŋŋə ɛŋŋə lə: lə: | | q̥ɤa: n̥: d̥ɛ: a | | n̥: n̥: | | ŋ: ŋ: |
| / / - - - / / | | - / - | | - - | | - - |

'Did Pui say ɛŋŋə ɛŋŋə just now?'

| ɛŋŋə: |
| - - |

| ɛ̃: m̃: |
| - / |

| ɛŋŋə |
| - - |

m̃:

A	P
| ɛŋŋə |	| m: : : : |
repeats	| m: : : : |
repeats	| m: : : : |
repeats	| ɛŋŋə |

Appendix 2.11

Vocalizations during the hungry state

- (a) P was hungry; he made crying-like sounds together with actual crying. (0;10.10)

A	P
| mam mam ə pau |	| ɲaŋ, ɲaŋ, ɲaŋ, ɲa |
'Does (Pui) want to mam mam?'	crying
| mam mam mam ma:m |	| amam ma:m ma: | mam mam ma:m ma |
(A is preparing his drink)	| mam mam ma:m ma |
Mother	| əma:m ma:m ma | ama: pa:pa:p ^h a |
| lu:k mɛ: hiu lɛ:u |	
'Mummy's baby is hungry.'	

Mother

P

m::pa:pa: | mam mam ma: ma: | -
 — \ — — \ —

lu:k mε: tpa: nɔ:n lε:u |
 \ \ — — —

mam | crying
 — |

'Mummy's baby is sleepy.'

pa: p^ha: mam | crying - being fed.
 — / —

Vocal play before being interrupted

(b)i After waking up, P vocalized

Grandmother

P

tpa tɛ tɛ: | tpa: tpa: tpa:^h: |
 — — / — — —

tpa:^{hə} |
 — —

kε:u tpa: |
 \ /

atpε: tpe: tpe: | atpa t^htpa | -
 — / — / — — —

'Parrot' and politeness particle

t^htpa: t^htpa: tpa:^h tpa:^h tpa: | -
 — — — / — \ —

atpa: tpe: tpe: |
 — — — —

ii P was 'reading'

bεp bεp bεp bεp bεp ba:[?] | -
 / \ — — \ —

bεp bε:p bεp bε:[?] bjε[?] | -
 — — — — —

Interaction: Responses from P to the adult models

(d)

A
t sa
t sa
-
t sa
-
t sa
-

P
laughter	? a: dza?	al: dla
dza?	a: tfa?	a: tfa?
-	-	-
d fa?	fa?	na?
-	-	-
na?	(pause: F laughs)	
-		

(e)

A
 | phu: t ma: thi ma: |
 | \ / / |
 'Say 'dog' please, 'dog'.
 | ma: |
 | / |
 | fa: fa: thi fa: |
 | - - - |
 '(Say) fa: fa: please, fa.'

P
 | ap: ma: pa: |
 | - - - |
 | ã: mã: |
 | - - |
 | m: pa: | m: p: m: pa: |
 | - - - |
 | fa: u p: wa: am: b v: wə |
 | - - - |
 | m: pa: | a: u p: pa |
 | - / - - |

Appendix 2.12

Stage VI: Interaction

(a) Proto-language

Grandmother

P

$\left| \begin{array}{c} \tilde{a} \\ \sim \end{array} \right| \left| \begin{array}{c} ?\tilde{a} \\ \sim \end{array} \right| \text{ (Inq)}$

$\left| \begin{array}{c} \text{ɔ: nan kɛ:u} \\ \backslash \quad \backslash \quad \backslash \end{array} \right|$

'Ah, that's a glass.'

$\left| \begin{array}{c} a: \\ - \end{array} \right| \text{ (inq)}$

$\left| \begin{array}{c} \text{nan dɔ:k ma:i} \\ \backslash \quad - \end{array} \right| \left| \begin{array}{c} \text{tɔ: kan dɔ:k ma:i} \\ - \quad - \end{array} \right| \left| \begin{array}{c} a: \quad ha: \\ - \quad - \end{array} \right| \text{ (Aff)}$

'That's a flower, a flower-vase.'

$\left| \begin{array}{c} \text{nan bua:} \\ \backslash \quad - \end{array} \right| \left| \begin{array}{c} \text{au bu:a} \\ - \quad - \end{array} \right| \left| \begin{array}{c} ?a \\ - \end{array} \right| \left| \begin{array}{c} ?\tilde{a} \\ - \end{array} \right| \text{ (Aff)}$

'That's a lotus.'

$\left| \begin{array}{c} \text{nan bu:a:} \\ \backslash \quad - \end{array} \right| \left| \begin{array}{c} ha \\ - \end{array} \right|$

'That's a lotus'

$\left| \begin{array}{c} \text{nai dɔ:k buə luk} \\ \backslash \quad - \quad \backslash \end{array} \right| \left| \begin{array}{c} \text{tɕhi: kɔ:n} \\ - \end{array} \right| \left| \begin{array}{c} \tilde{e}: \\ - \end{array} \right| \left| \begin{array}{c} \tilde{a} \quad \tilde{a} \\ \sim \quad \sim \end{array} \right| \left| \begin{array}{c} \tilde{a} \quad \tilde{a} \\ \sim \quad \sim \end{array} \right| \left| \begin{array}{c} ?\tilde{a} \quad ?\tilde{a} \quad ?\tilde{a} \\ - \quad - \quad - \end{array} \right| \text{ (Ins)}$

'Where is the lotus, Baby. Point
(at it) first.'

(P wants the telephone near the
lotus vase)

$\left| \begin{array}{c} ?m \quad ?m:: \text{hallo: hallo: tho:ra sap thiəu} \\ - \quad \backslash \quad - \quad \backslash \quad - \quad \backslash \quad - \quad - \quad - \end{array} \right|$

'Baby wants to telephone, really?'

Grandmother

P

au au len phat lom ik leu
- - \ - -

'Want to play with the fan also?'

pr:t phat lom ik leu
- - -

'Want to turn it on?'

pr:t phat lom ə luk
- - - \

'Does baby want to turn it on?'

ui phat lom mun ja:ŋ leu *1
- ✓ - -

'There, it is turning rapidly.'

mai au leu mai len leu
\ - \ \

'Not any more, not any more.'

pai thiəu pai thiəu
- \ - \

'(Let's) go out; go out.'

$\begin{array}{|c|c|c|} \hline ?e & ?e & ?e \\ \hline - & - & - \end{array}$ (Ins) (P wants an
electric fan, and
crawls to the object)

(P is about to press the button
to turn it on)

$\begin{array}{|c|c|} \hline h? & \ddagger \\ \hline \xi & \end{array}$ (Ins) (P wants to turn
it on)

(P presses the button)

$\begin{array}{|c|c|c|c|c|} \hline \xi:: & \xi & \xi & \tilde{a}: & \tilde{a}: & a: \\ \hline \backslash & & & & & - \end{array}$

(Satisfied)

$\begin{array}{|c|c|} \hline ?\tilde{a} & ?\tilde{\xi} \\ \hline \ddagger & \end{array}$ (Ins) (P wants to press
the button again)

*1 [-reu] conventionally.

(b) Responses to the adult models

In this sample, P's mother suggests that he have a rest.

P responds to her speech, so she goes on repeating the words she hears the baby attempt.

Mother	P
<p>| pai nɔ:n phak pai |</p> <p>| - - - - |</p>	<p>| dʒa: |</p> <p>| - |</p>
'(Let's) go and have a rest.'	
<p>| non phak |</p> <p>| - - - |</p>	<p>| pa: |</p> <p>| - |</p>
'Have a rest.'	
repeats	<p>| pu::pa: |</p> <p>| - - - |</p>
repeats	no response
<p>| phak si luk |</p> <p>| - - - |</p>	<p>| bak |</p> <p>| - - - |</p>
'Say phak, Baby.'	
<p>| phak | (pleased)</p> <p>| - - - |</p>	<p>| ɔpa::k |</p> <p>| - - - |</p>
repeats several times	(no more responses)

(c) In this sample, P's father is trying to get P to say words.

Father	P
<p>| phat lom: (repeats)</p> <p>| - - - |</p>	<p>| a | (P points at the electric fan)</p> <p>| - |</p>
'Fan'	

Father

P

ə phat

'Yes, 'fan'.'

(Changes topic)

<
| pha: | nai luk nai | pha: |
| ˩ | ˩ ˩ ˩ | ˩ |

'Cloth, where is it, Baby? Cloth.'

repeats

? ?
| ə |

<
| pha: | (repeats several times)
| ˩ |

< (pharyngalized)
| b̥ha: |
| ˩ |

'Cloth.'

<
| pha: | (pleased)
| ˩ |

< (pharyngalized)
| b̥ha: |
| ˩ |

'Cloth.'

(Changes topic)

pa:

pa::

(Adapted form for \phə:, 'Daddy')

(Changes topic)

| nai na:u nai na:u |
| ˩ - ˩ - |

? a: (P points at the lime tree)
| - |

'Where is the lime tree?' (repeats)

- (d) In this sample, P is crawling on the floor, and gets hold of a box of matches. His father takes it away, and says the word for 'matches' repetitively to P. Then he persuades P to go to the sewing-machine table.

Father	P
ja: len mai khi:t (repeats) | _ \ _ |	| ε | (Aff) | - |
'Don't play with matches, Baby.'	
mai khi:t | _ _ |	| ε | (Aff) | - |
'Matches'	
mai khi:t | _ _ |	| a | (Aff) | - |
'Matches'	
len tɕak pai | \ _ _ |	ha: dʒag | \ _ |
'Come, play at the sewing-machine.'	
ɕ tɕak (pleased) | - _ |	
'Yes, sewing machine.'	
nai liək ^{*1} mai thi lu:k tɕak | / \ _ \ | _ |	dʒag | _ _ |
'Say it again, Baby, 'Sewing machine'.'	
tɕak | _ |	adʒag | - _ |
'Sewing-machine.'	

*1 [\riək] conventionally.

Father

P

ə: atçak	
- -	

? dzag

'Yes, -a tçak'

dan	dan	<u>thi</u>	lu:k	toak
-	-			

dze?

'Say it loudly please, baby 'sewing-machine'.'

atçak
-

a :: :: :: :: :: :: ::
—
—
—

no more responses

(e) Vocal play

$\overset{<}{?}j\varepsilon::: \overset{<}{a}:i \mid \overset{?}{j}a:i \overset{?}{\varepsilon}:: \mid adj \pm: \varepsilon:: \mid \overset{<}{d}j\varepsilon:: \mid adj\varepsilon: \overset{d}{d}j\varepsilon \overset{d}{d}j\varepsilon \overset{d}{d}j\varepsilon \mid$

pause | ε dʒ ɪ: | dʒ a: | ɪ dʒ a: | lja, | lja: | ʔ ja | jja: | ɪ ja: | ɔ dja: | ɪ

²
 dʒa:ɪ dʒa:ɪ ?² a:: lja::ə (puts something into his mouth)

ɔ:u:.... ?u:.. ɬua: (takes it out) ɔ?ja:i jwɛ?j:a ?ja:

(f) Vocal play

ɛ̃ũ wɛ: ɛ̃ũ wjɛ: | a: ʔja: ʔjãũ ʔjɔ̃ aũ wa: | pause | a:ja: ja: jə

a:nan, nan, nə^m ma:m: mə əwauwə: | ne:ne: | ha: (pause, being interrupted by GM's comments)

Appendix 2.13

Stage VIII Verbal-vocal play followed by immediate responses

In this sample, P is 'reading' on his own. His mother is nearby listening without interruption. After a while, she makes a comment and produces a nursery rhyme, part of which P completes spontaneously and instantaneously.

P

dʒa:ʔ | ʔ:pa ʔ:pa:ʔ | nā:ʔ | ʔpa:ʔ | -
 - | ʔpa:ʔ | n::nā:ʔ | ʔpa:ʔ | pause
 bau wau wau wau jɔ:ʔ | -
 - | ʔpa:ʔ | ʔ: | aɲɛ: aɲɛ | pause
 faf faf fəʔ | pap pap pəp | -
 - | ʔɛ: ʔɛ: ɲɔ:ne: | ʔpa:ʔ | ʔa:uʔ | -
 - | aɲɛ:pa:ʔ | ʔpa:ʔ | ʔpa:ʔ | ʔa:ʔ | -
 - | ʔpa:ʔ | ʔa: ʔa: ʔa: | ʔn, ʔɛ:ʔ | -

Mother

P

| ɲa: ɲa: ? | ɛ: wɔu wɔu | ɲa: u: : : ɛ: : : | -

| ɲa: ɲə ? |

| pui a: n naŋ su: lɔlu: k hm |

| ɲau: ɲa: ? |

'Is Baby Pui reading, hm?'

| pui a: n wa: ɲai khap |

'What is Pui reading?'

| ka: xi ka: ə luk |

| wə: u wə: u | (instantaneously completes the second half)

'Is it the 'crow crow', Baby?'

'quickly, quickly'

(First three syllables are the first part of the rhyme)

| ka: xi ka: |

| a: wə ? |

'Crow, crow '

'quickly'

| bin ma: wai wai |

laughter

'Do fly here quickly, quickly.'

(second half of the above rhyme)

| ka: xi ka: |

| wɔu wa ? ɔu | ə wɔu wɔu wɔu ə wɔu |

'Crow, crow'

| mɛ: ɲu: xi | lu: k a: n tam mɛ: leu *1 |

laughter

contd.

*1 [-reu]

Mother

P

'Mother Snake.*1 Baby, repeat after

Mummy, come on.'

repeats

laughter

(no responses - the new rhyme is unfamiliar)

Appendix 2.14

Stage VIII Dialogues

(a) In this sample, P and his grandmother are 'reading'. P does the pointing and turning of the pages.

Grandmother

P

(laughs) | ma: |
|dog'

| ma: |

'dog'

| ni: dɔ:k ma:i |

| ?hm? |

'These are flowers.'

| kra ta:i ba:n ta: butpha: mi: |

(two fingers shown)

| ki tuə lu:k |

'How many rabbits are there at Grandpa B's house, Baby?'

*1 A new rhyme

Grandmother

| ɔ: sɔ:ŋ tuə |
| / / - |

'Yes, two rabbits.'

| ɔ: luk po:ŋ |
| / \ - |

'Yes, a balloon.'

| ni: arai luk |
| \ - - \ |

'What is this, Baby?'

| ɔ: tuk ta: |
| / - - |

'Yes, a doll.'

| luk po:ŋ |
| \ - |

'A balloon'

P

ʔhmʔ

(P laughs when he turns to the
page with a picture of children
laughing)

| bɔ: |
| / |

'balloon'

| ʔhm ʔhm |
| - - |

ʔa:ʔ

'doll'

| pɔ: |
| / |

'balloon'

| ma: |
| / |

'dog'

Grandmother

P

ma:
/

laughter

'dog'

ni arai luk | (points at the
\ -- \ | picture of a
balloon)

po:
/

'balloon'

'What is this, Baby?'

(b) In this sample, P's father is having an orange. P sees it and asks for some.

Mother

P

ẽ | bɔ̃? | bɔ̃? | ('I want an orange')

'peel, peel'

pɔ:k som ə khap
_ \ /

?hm? + crying-like sounds
_

'Does (Baby) want the orange peeled?'

Father (teases P)

mai pɔ:k hai | phɔ: maipɔ:k hai | ɛ̃:~? + crying-like sounds
/ _ \ / \ _ \

'Daddy won't peel it for baby; no,
Daddy won't.'

Father (proposes a condition)

som | liək*1 | som kɔ:n
/ \ / _

?ɔ: | pɔ̃?
_ _

'Orange. Say 'orange' first.'

'peel'

*1 [\riək]

Mother

P

| liak som kɔ:n |
| \ \ _ |

'Say 'orange' first.'

Father

| som |
| \ |

'Orange'

(annoyed)

| bɔ? pɔ? pɔ? ?ẽ: ẽ | paɔ? pa? ?ẽ: <
| _ _ _ - - | _ _ | \ |

'peel peel peel'- 'peel peel'

(being given one piece)

| pɔ? | (asks for another piece)
| _ |

'peel'

Appendix 2.15

Stage IX: Verbal-vocal play

P produced verbal-vocal play while he was running and walking in the house.

| pɛp pɛp pɛp pɛp pɛp | ppp | pɛp pɛp pɛb bɛ: pɛ ba: | ɔʃi: ʰɔʃi ci |
| _ _ _ _ _ | _ | _ _ _ \ - \ | _ - - |
| mam mam h::: ma:m mam ma:ʔ | (laughs) | ʔɛ: hɛ: mɛm | (laughs)
_ _ _ / / _		_ - -	
ʔɛ mɛm mɛm mam: mam	hɛ: mɛm mɛm mɛm	h: mam mam mɛm	mɛm mɛm mɛm mɛm
_ - - _ _	\ - / /	_ _ _	- - / /
ʔm	ha: pa: ʰbɿɛb bɿɛb: bɿɛb: bɿɛb: baʔ	tɿɛ: tɿɛ tɿɛ: tɿɛ lit tɛ:	
\	- \ _ / / /	_ _ _ - -	
tɛ:t tɛ:t	tɿ tɿt tɿ::tʔ	tɿɛ tɿɛ:d tɿɛ:d	pause
_ _	_ - -	_	

Appendix 2.16

Stage X: Examples of P's long utterances in a situational context.

(a) In this sample, P is cycling in the house; he comments on the state of the floor (wet), and attempts to hit his grandmother and Porn who is cleaning the floor.

(Meaning of the words uttered by P is given literally)

Father

P (1;4.16)

|	thu: pia [?]		thu: piɛ [?]		thu: piɛ [?]		thu: piɛ [?]	
	/		/		/		/	
	-		-		-		-	

'polish wet' 'polish wet' 'polish wet'

'polish wet'

laughs

|	thu: piɛ [?]	
	/	
	-	

'polish wet'

|	thu: piɛk	|
	/	
	-	

'polish wet'

(P cycles, hits Porn who is cleaning the floor and says:)

|	tɕhun tɕhun	|	phan phan	|
	-		-	

'hit' 'hit' 'Porn' 'Porn'

(GM comes into the house)

	[?] ja:i tɕhun		[?] ja:i		[?] ja:i	|	dun dun	|
	-		-		-		-	

|	dun dun	|	khen dun dun ^{*1}	|
	/		/	
	-		-	

'Grandma hit' 'Grandma Grandma' 'Daddy

Daddy' 'Daddy Daddy' 'Push Daddy Daddy'

*1 [-dun] is the second syllable of F's name, i.e. [-a-dun].

- (b) After cycling, P asks for a banana, and comments on what he needs and intends to do.

(Meaning of the words uttered by P is given literally)

P

|	ta:	ta [?]		hm	ta:	ta [?]		([-tat] or [-ta?]
|	-	-	|	\	-	-	|	means 'banana' to P)

'eat banana' 'eat banana'

Grandmother

|	tha:n	tat	tat	|
	-	-	-	

'eat banana'

|	lu:k	tha:n	tat	tat	|	|	ta:	ta [?]		(A banana is given)
	\	-	-	-			-	-		

'Baby wants to eat bananas?' 'eat banana'

|	po [?]	po [?]	pi [?]		ap [?]	po [?]	pa [?]		appo [?]	pe [?]	
	-	-	-		-	-	-		-	-	

'peel' 'peel skin' 'Daddy' 'peel skin' 'peel skin'

Father

|	po:k	e:ŋ	pai	|
	-	-	-	

'Peel it yourself, Baby.'

(P does, puts the banana skin in the bin, comes back and asks for a spoon.)

|	leu	au	pluək	thiŋ	than	|
	-	-	-	-	-	

|	khaja [?]	na	|
	-	-	

'and put the banana skin in the bin, please.'

P

| t̚chɔ:n t̚jɔ:n | jɔ:n | t̚chɔ:n ʔja:t̚h̥aʔ |
| - - - - - |

'spoon spoon' 'spoon spoon Grandma to spoon'

Girl (neighbour)

| ʔm t̚chɔ:n ma tak | | t̚aʔ t̚aʔ |
| - - - - - | | - - - - - |

'm, spoon to spoon it up.' 'to spoon' 'to spoon'

Father

| t̚chɔ:n mai au lu:k | (P has a bite)
| \ - \ |

'Don't have to use a spoon,

Baby.'

Girl

| pui ke:ŋ |
| / - |

'How clever Pui is!'

| t̚a: t̚at̚ t̚at̚ | (P offers his banana to
| - - - - - | the girl)
'eat banana banana'

Girl

| mai au phi: mai mam | | mam | (Insists on offering it to the girl)
| \ - \ \ - | | - |

'No thanks, 'sister' doesn't

want to eat'

| mam | (offers the girl his banana again)
| - |

Girl

P

| mai a phi: mai mam |
| \ - \ \ - |

'No thanks, 'sister' doesn't
want to eat.'

| ta' ta' au tɕhɔ:n tak | au tɕhɔ:n tak |
| - - - - - |

'to spoon to spoon want spoon to spoon'
'want spoon to spoon.'

Father

| mai tɕɔ au tɕhɔ:n tak |
| \ - - - |

(P has a bite and gives it to F)

'Don't have to use a spoon, Baby.'

| mam mam |
| - - |

'eat eat'

Father

| phɔ: mai mam |
| \ \ - |

'No, thank you.'

| mam phɔa mam mam | m h
| - - - - - | p ɔa mam mam |

'eat Daddy eat eat' 'Daddy eat eat'

| mam mam pha: | mam mam |
| - - - - - |

'eat eat Daddy' 'eat eat.'

| phɔ: mai mam pui mam na |
| \ \ - \ - |

(Offers his banana to the girl again)

'Daddy doesn't want it; Baby
eats it please.'

| mam mam phi:: mam |
| - - - - - |

'eat eat 'sister' eat.'

Appendix 2.17

Stage X: Verbal-vocal play

(a) P produced words in soliloquy (1;4.15)

| amme? |	| amme? |	| pho: |	| mɛ? pɔ? |	| pho:? |	pause
- -	- -	- -	- -	- -	

'Mummy Mummy Daddy Mummy Daddy Daddy'

| amme? |	| pho:? |	| mɛ? pho:?	| mɛ? pho:?	| amɛ? pho:?	| pho:?	| ho: |	pause
- -	- -	- -	- -	- -	- -	- -	

'Mummy Daddy Mummy Daddy Mummy Daddy Mummy Daddy Daddy'

| pho:? mɛ? |	| pho:? mɛ? |	| mja:mɛ? pho:?	| mpo: pho:?	pause
- -	- -	- -	- -	

'Daddy Mummy Daddy Mummy Mummy Daddy Daddy'

| pho:? amme? |	long pause	| pho:? amme? |	| pho? |	(Being interrupted by
| - - |		| - - |	| - - |	his mother)

'Daddy Mummy'

'Daddy Mummy Daddy'

(b) (1;5.06) In this sample, the verbal-vocal play consists of onomatopoeia, words, names and meaningless babbling.

((O) is for onomatopoeia, (N) names, (W) words, and (B) babbling.)

P is taking his clothes out of a basket.

(B)	(B)	(B)	(O)	(O)	(W)	(O)
| əki:: hət hət |	| əki:: |	| hɔri: ?jɛ? |	| ?jɛ?ə ?je? |	mod	| ?jɛ?i jə? |	
- -	- -	- -	- -	- -	- -	

'dirty''dirty''dirty''all gone''dirty''dirty'

(O)	(O)	(O)	(O)	(O)
a [?] jɛ [?]	ajə [?] jɛ [?] h::	a: jə [?] a: jɛ [?]	jə [?] h::	aje [?] a [?] jə [?]
-	-	-	-	-
'dirty'	'dirty'	'dirty'	'dirty'	'dirty'
(W)	(W)	(W)	(B) (B) (B)	(W) (B)
m _j od	mot	^h mmot	hi: ka: udza?	jə ^m bpu
-	-	-	-	-

'all gone' 'all gone' 'all gone' 'medicine'

(O)	(B)	(O)	(B)	(O)	(O)
jɛ [?]	hi	təhɛ ^t tɛ ^t təhɛ ^t	that	pu::: pu:::	aupu::
-	-	-	-	-	-

'dirty' 'mouse' 'car, train' 'car, train'

(B)	(B)	(B)	(W)	(W)	(O)	(W)
a::u: u [?] u:	that	ɛ [?] tha?	ɛ: du:a	du:a	jɛ [?]	du:a
-	-	-	-	-	-	-

'peanut' 'peanut' 'dirty' 'peanut'

(O)	(O)	(O)	(O)	(B)	(B)	(O)
e [?] jɛ [?] h:	jɛ [?]	pɛ [?] jɛ [?] jə [?]	jɛ [?] h::	edze:	edze:	tho:u
-	-	-	-	-	-	-

'dirty' 'dirty' 'dirty' 'dirty' 'smelly'

(B)	(B)	(B)	(B)	(B)	(B)	(B)	(B)
muə ⁱ mɔ:i	əmmɔ:i	mɔ:i ^{ij} e	əmmɔ:i	mmɔ:i	mmɔ:i	i:thɔi	hi:a:i
(laughs)	(B)	(B)	(B)	(B)	(B)		

i: i:	mge	tɛhi:	tɛhi:	that	^h m tɔ:u	^h m pi [?]	hɛ pi?
(W)	(W)	(W)	(W)	(W)	(W)	(W)	(laughs)

^h bi?	^{hm} bi?	bi?	bi?	bi?	pi [?] h:	ppp::	he:
-	-	-	-	-	-	-	-

'break into 'break' 'break' 'break' 'break' 'break' pieces'

(B) (B) (B) (W) (B) (B) (B) (B)

- | m::wə | amwɔi | goŋãn | m^ho: | ɲãn | m:: buŋan | i:: | mpo? | -

'balloon'

(W) (O) (O) (N) (N)

- | mien | tɕhau | thɔu thɔu^hu | adun | m^hta: u tɕha: |

'Smelly' 'smelly' 'smelly' F's name 'Grandpa Bucha'

(pause, being interrupted by M)

Appendix 2.18

Stage X: List of vocabulary (excluding onomatopoeic words)

(The examples are grouped by type of onset, e.g. labial, alveolar, palatal, velar and glottal.)

One word utterances

P's forms	Meanings	Adult forms
[-phu:, -phu:, \phu:]	rose apple	[tɕhom \phu:]
[-phɔ:, \phɔ:]	father	[\phɔ:]
[-phan, -phɔn]	Porn	[-phɔ:n]
[-phi:, \phii:]	elder sister	[\phii:]
[\pha:, \pha: ^h]	cloth	[\pha:]
[-pha?, -pha:? ^h]	monk	[phra]
[-pha?]	push	[phlak]
[-pha?]	vegetable	[phak]
[phat]	to blow (wind)	[phat]

P's forms	Meanings	Adult forms
[\pha:t, _pha:t, -pha:t]	P's name	[[?] o:\pha:t]
[_pi?, _pit]	to close	[pit]
[_bi?]	to break (into pieces)	[bi?]
[_a_be?]	bus	[⁻ ba:, ⁻ bas] (loan word)
[_pə?, _pɔ?, _pɔt]	to open	[⁻ pɔ:t]
[_piɛ?, _pia?]	to be wet	[⁻ piək]
[_piɛ?, _pia?]	skin (fruit)	[⁻ pluək]
[/po:, /pu:]	balloon	[⁻ lu:k-po:ŋ]
[/po:, /pu:]	paternal grandfather	[⁻ pu:]
[_pɔ?]	to peel	[⁻ pɔ:k]
[/pau]	M's pet name	[/pau]
[⁻ bin]	fly	[⁻ bin]
[⁻ mam]	to eat (baby talk)	[⁻ mam]
[/mɔ:n]	pillow	[/mɔ:n]
[⁻ mua?]	hat, cap	[⁻ muək]
[\mɛ:, _mɛ?]	mother	[\mɛ:]
[/mun, /mu:n]	to turn round	[/mun]
[/mu:]	pork, pig	[/mu:]
[/ma:, ⁻ ma:]	dog	[/ma:]
[/ma:, ⁻ ma:]	horse	[⁻ ma:]
[/mi:]	bear	[/mi:]
[/mien]	smelly	[/men]
[/mɔ:]	doctor	[/mɔ:]
[⁻ mot, ⁻ mod]	none left	[⁻ mot]
[⁻ mɔ [?]]	Mae Moh district	[\mɛ: ⁻ mɔ?]
[⁻ wai]	quickly	[⁻ wai]
[⁻ wai]	to put (on surface)	[⁻ wai]
[⁻ wua]	cow	[⁻ wuə]

[\wau]	kite	[\wa:u]
[/wa:n, /wan]	sweet, 'a drink'	[/wa:n]
[/wa:n, /wan]	his cousin's name	[/wa:n]
[_thai]	to wear	[_sai]
[/tha:, /tho:]	two	[/so:ŋ]
[/thu:]	polish	[/thu:]
[-tha:, -ta:]	to eat	[-tha:n]
[_to?]	table	[_to?]
[_to?]	sewing machine	[_təak]
[_to?]	drop, fall down	[_tok]
[/tɕi]	M's pet name	[/tɕi]
[-təʔ, -tak]	to spoon (food) up	[_tak]
[-dun, -a-dun]	F's name	[-a-dun]
[\duəi, \doi]	together, also	[\duəi]
[-dua]	peanut	[_thuə]
[-nai]	in	[nai]
[-ni:]	second syllable of Grandmother's name	[-pra: -ni:]
[-no:n]	to sleep	[-no:n]
[-no?]	outside	[\no:k]
[-tɕhin]	piece	[-tɕhin]
[-tɕhak, -tɕhak, -tɕha?]	to pull	[-tɕhak]
[-tɕho:n, -tɕhun, -tɕo:n]	spoon	[-tɕho:n]
[-ja:i]	maternal grandmother	[-ja:i]
[-ja:, -ja:ʔ]	medicine	[-ja:]
[/jo:]	'Hello' (telephone)	[-hal lo:] (loan word)
[-jen]	cold, cool	[-jen]
[-jot]	vehicle	[-rot]

[- ¹ jɔŋ]	come down	[-lɔŋ]
[¹ vje:]	'Birley's'	[-bai \le:]
[/khen]	push (car, bicycle)	[/khen]
[\kuəi, \toi]	banana	[\kluəi]

(in addition to _təʔ _təʔ)

[-khi:]	to ride (vehicle)	[-khi:]
[-ʔau]	want	[-ʔau]
[-ʔɔʔ]	out	[-ʔɔ:k]

Two word utterances

[-ʔɔ: -tɔ:, -tɔ: -tɔ:]	papaya	[-ma-la-kɔ:]
[-tu -tɛn]	refrigerator	[\tu: -jen]
[-tɕhi:t -tɕa:]	give injection	[-tɕhɪt -ja:]
[-tu -tɛ, - ¹ u -tɛ]	big lizard	[-tuk -kɛ:]
[-tɔ: \ ¹ ja:]	Coca Cola	[-kho: \la:]

REFERENCES

Early Vocalizations

1. Crystal, D. 1970. 'Prosodic Systems and Language Acquisition.' In Prosodic Feature Analysis. P. Léon (ed.). Didier, Montreal, Paris and Bruxelles.
2. Crystal, D. 1973. 'Non-Segmental Phonology in Language Acquisition: a Review of the Issues.' Lingua 32.
3. Delack, J.B. and Fowlow, P.J. In press. 'The Ontogenesis of Differential Vocalization: Development of Prosodic Contrastivity During the First Year of Life.' In The Development of Communication: Social and Pragmatic Factors in Language Acquisition. N. Waterson and C.E. Snow (eds.). John Wiley and Sons.
4. Gilbert, J.H. 1974. 'On Babbling: Some Physiological Observations.' Papers and Reports on Child Language Development. Stanford University, Stanford, California.
5. Gruber, J.S. 1966/1973. 'Playing with Distinctive Features in the Babbling of Infants.' In Studies of Child Language Development. C.A. Ferguson and D.I. Slobin (eds.). Holt, Rinehart and Winston, Inc., New York.
6. Irwin, O.C. 1947. 'Infant Speech: Consonant Sounds According to Place of Articulation.' Journal of Speech Disorders 12.
7. Jakobson, R. 1968. Child Language Aphasia and Phonological Universals. Mouton, The Hague.
8. Johnson, C. and Bush, C.N. 1971. 'A Note on Transcribing the Speech of Young Children.' Papers and Reports on Child Language Development, Stanford University, Stanford, California.
9. Leopold, W.F. 1939/1970. Speech Development of a Bilingual Child: a Linguist's Record. Vol. 1. AMS Press, New York.
10. Lewis, M.M. 1936. Infant Speech: a Study of the Beginnings of Language. Routledge and Kegan Paul, London.
11. Lieberman, P. 1967. Intonation Perception and Language. MIT Press.
12. Oller, D.K. et al. 1976. 'Infant Babbling and Speech.' Journal of Child Language. Vol. 3 No. 1.

13. Pierce, J.E. 1974. 'A Study of 750 Portland, Oregon Children.' Papers and Reports on Child Language Development, Stanford University, Stanford, California.
14. Stark et al. 1975. 'Features of Infant Sounds: the First Eight Weeks of Life.' Journal of Child Language. Vol. 2 No. 2.
15. Taine, H. 1877/1971. 'Acquisition of Language by Children.' In Child Language: a Book of Readings. A Bar-Adon and W.F. Leopold (eds.). Prentice-Hall, Inc., Englewood Cliffs, New Jersey.
16. Tonkova-Yampol'skaya 1969/1973. 'Development of Speech Intonation in Infants During the First 2 Years of Life.' In Studies of Child Language Development. C.A. Ferguson and D.I. Slobin (eds.). Holt, Rinehart and Winston, Inc., New York.
17. Winitz, H. and Irwin O.C. 1958. 'Syllabic and Phonetic Structure of Infants' Early Words.' Journal of Speech and Hearing Research. Vol. 1 No. 3.
18. Winitz, H. 1961. 'Repetitions in Vocalizations and Speech of Children in the First 2 years of Life.' Studies of Speech Disfluency and Rate. Reprinted from Monograph supplements of Journal of Speech and Hearing Disorders, June 1961.

Proto-Language

19. Carter, A.L. 1975. 'The Transformation of Sensorimotor Morphemes into Words: a Case Study of the Development of 'more' and 'mine'.' Journal of Child Language. Vol. 2 No. 2.
20. Carter, A.L. In press. 'The Development of Systematic Vocalizations Prior to Words: a Case Study.' In The Development of Communication: Social and Pragmatic Factors in Language Acquisition. N. Waterson and C.E. Snow (eds.). John Wiley and Sons.
21. Dore, J. 1975. 'Holophrases, Speech Acts and Language Universal.' Journal of Child Language. Vol. 2 No. 1.
22. Dore, J. et al. 1976. 'Transitional Phenomena in Early Language Acquisition.' Journal of Child Language. Vol. 3 No. 1.
23. Ferrier, L. In press. 'Some Observations of Error in Context.' In The Development of Communication: Social and Pragmatic Factors in Language Acquisition. N. Waterson and C.E. Snow (eds.). John Wiley and Sons.

24. Halliday, M.A.K. 1975. Learning how to Mean: Explorations in the Development of Language. Edward Arnold.
25. Nakazima, S. 1972. 'A Comparative Study of the Speech Development of Japanese and American Children - the Beginning of Phonemicization Process.' Studia Phonologia VI.

Child Language Development

26. Bowerman, M.F. In press. 'The Acquisition of Word Meaning: an Investigation of Some Current Conflicts.' In The Development of Communication: Social and Pragmatic Factors in Language Acquisition. N. Waterson and C.E. Snow (eds.). John Wiley and Sons.
27. Bloom, L. 1970. Language Development: Form and Function in Emerging Grammars. MIT Press.
28. Braine, M.D.S. 1963. 'The Ontogeny of English Phrase Structure: the First Phase.' Language 3.
29. Brown, R. and Fraser, C. 1964. 'The Acquisition of Syntax.' In The Acquisition of Language. U. Bellugi and R. Brown (eds.) The University of Chicago Press.
30. Clark, E. 1973. 'What's in a Word? On the Child's Acquisition of Semantics in His First Language.' In Cognitive Development and the Acquisition of Language. T. Moore (ed.). Academic Press, New York.
31. Ferguson, C.A. and Farwell, C.B. 1973. 'Words and Sounds in Early Language Acquisition: English Consonants in the first Fifty Words.' Papers and Reports on Child Language Development. Stanford University, Stanford, California.
32. Keenan, E.O. and Klein E. 1974. 'Coherency in Children's Discourse.' Paper presented at the Summer Meeting of the Linguistic Society of America. Amherst, Mass.
33. Menyuk, P. 1971. The Acquisition and Development of Language. Prentice-Hall, Inc., Englewood Cliffs, New Jersey.
34. Miller, W. and Ervin, S. 1964. 'The Development of Grammar in Child Language.' In The Acquisition of Language. U. Bellugi and R. Brown (eds.). The University of Chicago Press.
35. Nelson, K. 1974. 'Concept, Word and Sentence: Interrelations in Acquisition and Development.' Psychological Review 81.

36. Slobin, D.I. 1973. 'Cognitive Prerequisites for the Development of Grammar.' In Studies of Child Language Development. C.A. Ferguson and D.I. Slobin (eds.). Holt, Rinehart and Winston, Inc., New York.
37. Waterson, N. 1971. 'Child Phonology: a Prosodic View.' Journal of Linguistics. Vol. 7 No. 2.
38. Waterson, N. 1976. 'Perception and Production in the Acquisition of Phonology.' In Baby Talk and Infant Speech. W. von R. Engel and Y Lebrun (eds.). Swets and Zeilinger, the Netherlands.
39. Waterson, N. In press. 'Growth of Complexity in the Acquisition of Phonology.' In The Development of Communication: Social and Pragmatic Factors in Language Acquisition. N. Waterson and C.E. Snow (eds.). John Wiley and Sons.
40. Weir, R. 1962. Language in the Crib. Mouton, The Hague.

Adult-Child Interaction and Adult Language Addressed to Children

41. Blount, B.G. 1972. 'Parental Speech and Language Acquisition: Some Iuo and Samoan Examples.' Anthropological Linguistics. 14.
42. Bruner, J.S. 1975. 'The Onotogenesis of Speech Acts.' Journal of Child Language. Vol. 2 No. 1.
43. Bullowa, M. et al. 1964. 'The Development from Vocal to Verbal Behavior in Children.' In The Acquisition of Language. U. Bellugi and R. Brown (eds.). The University of Chicago Press.
44. Doroudian, M. 1975. The Acquisition of Persian and English Syntax. PhD thesis, University of London.
45. Farwell, C.B. 1973. 'The Language Spoken to Children.' Papers and Reports on Child Language Development. Stanford University, Stanford, California.
46. Ferguson, C.A. 1964. 'Baby Talk in Six Languages.' A reprint from American Anthropologist. Vol. 66 No. 6.
47. Garnica, O.K. In press. 'Some Prosodic Characteristics of Speech to Young Children.' In Talking to Children: Language Input and Acquisition. C.E. Snow and C.A. Ferguson (eds.). Cambridge University Press.

48. Rūke-Draviņa, V. In press. 'Modifications of Speech Addressed to Young Children in Latvian.' In Talking to Children: Language Input and Acquisition. C.E. Snow and C.A. Ferguson (eds.). Cambridge University Press.
49. Sacks, H. et al. 1974. 'A Simplest Systematics for the Organization of Turn Taking for Conversation.' Language 50.
50. Snow, C.E. In press. 'Mothers' Speech Research: from Input to Interaction.' In Talking to Children: Language Input and Acquisition. C.E. Snow and C.A. Ferguson (eds.). Cambridge University Press.
51. Snow, C.E. 1976. 'The Development of Conversation between Mothers and Babies.' Pragmatics Microfiche.
52. Sylvester-Bradley, B., and Trevarthen C. In press. 'Babytalk as an Adaptation to the Infant's Communication.' In The Development of Communication: Social and Pragmatic Factors in Language Acquisition. N. Waterson and C.E. Snow (eds.). John Wiley and Sons.
53. Tuaycharoen, P. In press. 'The Babbling of a Thai Baby: Echoes and Responses to the Sounds Made by Adults.' In The Development of Communication: Social and Pragmatic Factors in Language Acquisition. N. Waterson and C.E. Snow (eds.). John Wiley and Sons.

General Phonetics and Linguistics

54. Abercrombie, D. 1967. Elements of General Phonetics. Edinburgh University Press.
55. Allen, W.S. 1954. 'Retroflexion in Sanskrit: Prosodic Technique and its Relevance to Comparative Statements.' B SOAS 16.
56. Firth, J.R. 1970. 'Sounds and Prosodies.' In Prosodic Analysis. F.R. Palmer (ed.). Oxford University Press.
57. Lyons, J. 1968. Introduction to Theoretical Linguistics. Cambridge University Press.
58. Robins, R.H. 1970. 'Aspects of Prosodic Analysis.' In Prosodic Analysis. F.R. Palmer (ed.). Oxford University Press.

Tone Languages

59. Abramson, A.S. 1962. The Vowels and Tones of Standard Thai: Acoustic Measurements and Experiments. Mouton, The Hague.
60. Chao, Y.R. 1951/1973. 'The Cantian Idiolect: an Analysis of the Chinese Spoken by a Twenty-eight Months Old Child.' In Studies of Child Language Development. C.A. Ferguson and D.I. Slobin (eds.). Holt, Rinehart and Winston, Inc., New York.
61. Clumeck, H. 1976. 'Acquisition of the Tonal Contrasts of Mandarin.' Summary of a Talk Given at Child Phonology Noon Seminar, Stanford University.
62. Erickson, D. 1974. 'Fundamental Frequency Contours of the Tones of Standard Thai. Pasa, Bangkok
63. Henderson, E.J.A. 1964. 'Marginalia to Siamese Phonetic Studies.' In In Honour of Daniel Jones. D. Abercrombie et al. (eds.). Longmans.
64. Henderson, E.J.A. 1970. 'Prosodies in Siamese: a Study in Synthesis.' In Prosodic Analysis. F.R. Palmer (ed.) Oxford University Press.
65. Kiriloff, C. 1969. 'On the Auditory Perception of Tones in Mandarin.' Phonetica 20.
66. Li, C.N. and Thompson, S.A. In press. 'The Acquisition of Tone in Mandarin-Speaking Children.' To appear in Journal of Child Language.
67. Panupong, V. 1970. Inter-Sentence Relation in Modern Conversational Thai. The Siam Society, Bangkok.
68. Tuaycharoen, P. 1974. Comparison of Tones in Standard Thai and the Surathani Dialect. M.A. dissertation, University of Leeds.

Relevant References but not Available to the Writer of this Thesis

69. Hombert, J. 1974. 'Production and Perception: Their Respective Roles in One Case of Tonal Development.' Paper presented at 49th Annual Meeting of the Linguistic Society of America. To appear in U.C.L.A. working paper in Phonetics 32.

70. Hombert, J. 1975. 'The Perception of Contour Tones.'
Proceedings of the First Annual Meeting of the Berkeley
Linguistics Society, Berkeley.
71. Murai, J. 1963/1964. 'The Sounds of Infants.' Studia
Phonologica 3.
72. Ohala, J. 1973. 'The Physiology of Tone.' Consonant Types
and Tone. L.M. Hyman (ed.). Southern California
Occasional Papers in Linguistics. 1, 1-11.
73. Ohala, J. and Ewan, W. 1973. 'Speed of Pitch Change.' Abstract
for Journal of the Acoustical Society of America 53.
74. Sundberg, J. 1973. 'Data on Maximum Speed of Pitch Changes.'
Speech Transmission Laboratory Quarterly Progress and
Status Report. Royal Institute of Technology, Stockholm 4.
75. Tse, J. 1973. The Upper Even Tones in Cantonese: an Instru-
mental Investigation. Master's thesis, Taipei: The
National Taiwan Normal University.

- Vietnamese Basic Course Vol. 1-2,
Washington, Foreign Service Institute.
- Jones, Robert B.: 1961.
Karen Linguistic Studies: Description,
Comparison and Texts, University of
California Press.
- Katz, Jerrold J.: 1967.
"The Logic of Questions", in Van Rooselaar
and Staal, eds., Logic, Methodology, and
Philosophy of Science, Vol. 3, Amsterdam,
North-Holland.
- 1970.
"Interpretive Semantics vs Generative
Semantics", Foundations of Language 6(2):
220-259.
- 1972.
Semantic Theory, New York, Harper & Row.
- and Paul Postal: 1964.
An Integrated Theory of Linguistic Des-
cription, Cambridge, Mass., MIT Press.
- Kempson, Ruth M.: 1975.
Presupposition and the Delimitation of
Semantics, Cambridge University Press.
- Klima, Edward S.: 1964.
"Negation in English", in Fodor and Katz
(1964): 246-323.
- Koutsoudas, Andreas: 1968.
"On wh-words in English", Journal of
Linguistics, IV: 267-273.
- Kruisinga, Etsko: 1915.
English Accidence and Syntax, Vol. 2 of
A Handbook of Present Day English, 2nd
edition.
- Kuno, Susumu and Jane J. Robinson: 1972.
"Multiple Wh Questions", Linguistic
Inquiry 3: 463-487.
- Kuroda, S.-Y.: 1969.
"Attachment Transformations", in Reibel
and Schane (1969): 331-351.

Lakoff, George: 1969.

"On Derivational Constraints",
Papers from the Fifth Regional Meeting of
Chicago Linguistic Society, University of
 Chicago.

1970.

Irregularity in Syntax, New York, Holt,
 Rinehart and Winston.

and Stanley Peters: 1969.

"Phrasal Conjunction and Symmetric Predi-
 cates", in Reibel and Schane (1969): 113-142.

Lakoff, Robin: 1968.

Abstract Syntax and Latin Complimentation,
 Cambridge, Mass., MIT Press.

1969.

"A Syntactic Argument for Negative Trans-
 portation", in Binnick et al. (1969),

Papers from the Fifth Regional Meeting of
the Chicago Linguistic Society, pp. 140-147.

Langacker, Ronald W.: 1965.

"French Interrogatives: A Transformational
 Description", Language 41: 587-600.

1972.

Fundamentals of Linguistic Analysis,
 New York, Harcourt Brace Jovanovich, Inc.

1974.

"The Question of Q", Foundations of
Language 11: 1-37.

Lasnik, Howard: 1972.

Analysis of Negation in English,
 unpublished Ph.D. dissertation, MIT,
 Cambridge, Mass.

Lee, Kee-dong: 1975.

Kusaiean Reference Grammar, Honolulu,
 University of Hawaii Press.

Lekawatana, Pongsri: 1970.

Verb Phrase in Thai: A Study in Deep Case
Relationships, unpublished Ph.D. disser-
 tation, University of Michigan.

- Li, Fang-Kuei: 1960.
 "A Tentative Classification of Tai Dialects",
 in S. Diamonds, ed., Culture in History,
 New York, pp. 951-959.
- Lin, Shuang-fu: 1974.
 "Reduction in Taiwanese A-not-A Questions",
Journal of Chinese Linguistics 2(1): 37-77.
- McCawley, James D.: 1968a.
 "The Role of Semantics in a Grammar",
 in Bach and Harms (1968): 125-169.
- 1968b.
 "Lexical Insertion in a Transformational
 Grammar without Deep Structure", in
 Darden, Bailey, Davidson (1968): 71-80.
- Malone, Joseph L.: 1967.
 "A Transformational Reexamination of
 English Questions", Language 43: 686-702.
- Matisoff, James A.: 1973.
The Grammar of Lahu, Berkeley, University
 of California.
- Munitz, M.K. and P.K. Unger, eds.: 1974.
Semantics and Philosophy, New York,
 New York University Press.
- Needleman, Rosa: 1973.
Tai Verbal Structures and Some Implications
 for Current Linguistic Theory, unpublished
 Ph.D. dissertation, UCLA.
- Nilsen, Don L.F.: 1967.
English Adverbials, The Hague, Mouton.
- Noss, Richard B.: 1964.
Thai Reference Grammar, Washington,
 Foreign Service Institute.
- Palmer, Harold: 1927. (1939, 2nd edition).
A Grammar of Spoken English, Cambridge,
 Heffer & Sons Ltd.
- Panupong, Vichin: 1970.
Inter-sentence Relations in Modern Conver-
 sational Thai, Bangkok, Siam Society.

Partee, Barbara H.: 1970.

"Negation, Conjunction, and Quantifiers:
Syntax and Semantics", Foundations of
Language 6: 153-165.

Perlmutter, David M.: 1971.

Deep and Surface Structure Constraints in
Syntax, New York, Holt, Rinehart and Winston.

Peters, Stanley, ed.: 1972.

Goals of Linguistic Theory, Englewood
Cliffs, N.J., Prentice-Hall.

Puttaraksar, Narong: 1974.

Some Aspects of the Classifiers of Thai,
Unpublished M.A. dissertation, University
of Reading.

Rand, Earl: 1969.

The Syntax of Mandarin Interrogatives,
University of California Press.

Reibel, David A. and Sanford A. Schane, eds.: 1969.

Modern Studies in English,
Englewood Cliffs, N.J., Prentice-Hall.

Roengpitya, Kanita: 1974.

"Negation in Thai: A Study in Semantic
Relationships", in Bulletin of the Faculty
of Arts, Vol. 8: 93-146, Bangkok,
Chulalongkorn University.

Roffe, G. Edward: 1946.

"The Phonemic Structure of Lao", in
Journal of American Oriental Society 66:
289-295.

Ross, John R.: 1967.

Constraints on Variables in Syntax,
Ph.D. dissertation, MIT, Cambridge, Mass.
1970.

"Gapping and the Order of Constituents",
in Bierwisch and Heidolph (1970): 249-259.

Sadock, Jerrold M.: 1970.

"Whimperatives", in Sadock and Vanek eds.
(1970), Studies Presented to Robert B. Lees
by His Students, Edmonton, Ill., Linguistic
Research, Inc.

- Searle, John: 1976.
 "The Rule of the Language Game", in
TLS. Sept. 10, 1976: 1118-1120.
- Seuren, Pieter A.M.: 1974.
Semantic Syntax, Oxford University Press.
- Siddiqui, A.H.: 1973.
 "Notes on Queclaratives and Tag Questions
 in Hindi-Urdu", in Studies in the Linguistic
 Sciences Vol. 3(2), University of Illinois.
- Sinlapasarn, Phraya Upakit: 1971.
Lak Phaasaa Thai (The Principles of the Thai
 Language), Bangkok, Thai Watana Phanit.
- Stampe, Dennis W.: 1974.
 "Attributives and Interrogatives", in
 Munitz and Unger, eds. (1974),: 159-196.
- Stockwell, Robert P., P. Schachter, and B.H. Partee: 1973.
The Major Syntactic Structures of English,
 Holt, Rinehart and Winston, Inc.
- Teoh, Irene: 1967.
 "Auxiliary Verbs and the A-not-A Questions
 in Amoy", Monumenta Serica 26: 295-304.
- Thonglor, Kamchai: 1972.
The Principles of Thai (5th ed.), Bangkok.
- T'sou, Benjamin K.-Y.: 1971.
Studies in the Phylogenesis of Questions and
 Diachronic Syntax, unpublished Ph.D. disser-
 tation, Berkeley, University of California.
- Ullian, Russell: 1969.
 "Some General Characteristics of Interro-
 gative Systems", Working Papers on Language
 Universals No. 1, pp. 41-63, Stanford
 University.
- Warotamasikkhadit, Udom: 1972 (1963).
Thai Syntax: An Outline, The Hague, Mouton.
 1975.
- "Dependency of Underlying Structure and
 Final Particles in Thai", in Harris and
 Chamberlain eds. (1975): 342-354.

Warutamasintop, Worawut: 1973.

"Evidence for the Structure of Verbs in Series in Thai", Paper read at the 6th International Conference on Sino-Tibetan Language and Linguistics, Oct. 19-21, 1973, San Diego, Calif.

Yates, W.G. and S. Sayasithsena: 1970.

Lao Basic Course, Vols. 1-2, Washington, Foreign Service Institute.

Zwicky, Arnold M. and Ann D. Zwicky: 1973.

"HOW COME and WHAT FOR", in Issues in Linguistics, B.B. Kachru et al. eds., University of Illinois Press.